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USSR Report

EARTH SCIENCES

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USSR REPORT
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CONTENTS

TERRESTRIAL GEOPHYSICS

BRIEFS

POSSIBILITY OF FORECASTING TORNADOES--Soviet geophysicists believe it is possible to forecast tornadoes. For that purpose they proposed to watch closely the movement of cyclones and the adjacent layers of the atmosphere, air temperature and wind velocity. An abrupt change of all these indicators is a sign of a tornado in the making. [Text] [Moscow TASS in English 16 Oct 86] 12955

CSO: 1865/36-E

UDC 911.3:546.22(104)

ASPECTS OF ECONOMIC GEOGRAPHY OF ENVIRONMENTAL POLLUTION BY SULFUR OXIDES IN WELL-DEVELOPED CAPITALIST COUNTRIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian No 5, Sep-Oct 86 (manuscript received 26 Feb 86) pp 45-51

[Article by Yu. I. Monina, Geography Institute, USSR Academy of Sciences]

[Abstract] The greatest contribution to environmental pollution by technogenic sulfur oxides is from petroleum. Sulfur, during petroleum refining or during the combustion of petroleum products, is expelled into the atmosphere in the form of oxides. The accumulation of sulfur oxides in an air basin results in the pollution of water bodies and soils by acid rain. This makes it important to study the economic geography of environmental pollution by sulfur oxides in the capitalist countries. All petroleums can be classified as low or high in sulfur content. A country-by-country analysis is made with respect to both exporters and importers. Emphasis is on high-sulfur petroleum, although data on high-sulfur petroleum production and consumption are not published separately with respect to importation and exportation. Great Britain is the greatest source of such petroleum. (Figure 1 is a world map of the production and consumption of high-sulfur petroleum in the capitalist countries.) The widespread pollution in the well-developed capitalist countries is on high-sulfur petroleum, although data on high-sulfur petroleum data on high-sulfur petroleum production and consumption are not published separately with respect to importation and exportation. Great Britain is the greatest source of such petroleum. (Figure 1 is a world map of the production and consumption of high-sulfur petroleum in the capitalist countries.) The widespread pollution in the well-developed capitalist countries is in reality their own fault. Great quantities of high-sulfur petroleum are being used in such countries as the United States, West Germany, Italy, France, Holland, Great Britain, Sweden and Spain, and the greatest pollution with sulfur oxides should be observed precisely in these countries. Such countries as Great Britain, Norway, Canada and the United States produce

their own high-sulfur petroleum, in addition to being importers of great quantities. Figure 1; references: 4 Western.

5303/12955
CSO: 1865/100

UDC 551.58

CLIMATE STABILITY AND VARIABILITY DETERMINED FROM ITS PARAMETERS FOR TERRITORY OF USSR DURING GROWING SEASON

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian No 5, Sep-Oct 86 (manuscript received 17 Dec 85) pp 5-20

[Article by G. N. Vitvitskiy, Geography Institute, USSR Academy of Sciences]

[Abstract] It is demonstrated that zonal and meridional forms of atmospheric circulation to an equal degree maintain an equilibrium between the inflow and outflow of heat and moisture in the northern hemisphere. This is due to the constancy of climatic fields of air temperature and precipitation regardless if one form of circulation predominates over the other. However, in individual years (or series of years) the balance is disrupted, resulting in an air temperature and precipitation anomaly. When averaged over a minimum period of 10 years, despite these anomalous years, the actual variability of climate is expressed very slightly. Examples are presented constituting clear evidence that cold or warm, moist or dry growing seasons, if averaged for a decade as the lower limit for climatic generalization, result from anomalous months of individual years which do not run consecutively but alternate with ordinary months. For this reason such periods leave no trace in soils or vegetation. No shifting of climatic boundaries occurs which is expressed in soils and vegetation without the persistence of high or low air temperatures, great or small sums of precipitation, which rarely occurs. This seems quite evident from the absence of data which would confirm any prolonged climatic changes during the instrumental observation period. Figures 4; references: 9 Russian.

5303/12955
CSO: 1865/100

SEA OF OKHOTSK YIELDS NEW INFORMATION AND VALUABLE MINERAL SAMPLES

Moscow TASS in Russian 24 Nov 86

[Text] Moscow November 24 TASS - Scientists of Sakhalin, Moscow and Vladivostok have brought from their cruise in the Sea of Okhotsk on board the research vessel "Pegas" a structural-geological chart showing the bed of one of the biggest seas of the Far Eastern region.

"A whole cycle of research has been completed on the composition and age of rock of the seabed of the Sea of Okhotsk," correspondents of the newspaper "Sovetskaya Rossiya" were told by Oleg Kornev, the head of the expedition and head of the laboratory of the Marine Geology and Geophysics Institute.

USSR Academy of Sciences. Now scientists can forecast with greater accuracy the further search and prospecting for minerals. Valuable material has been obtained also for the general evaluation of the geological situation in that region. It turns out that a seabed can also ...sink. This is precisely what happens with the continental bed plate under the Sea of Okhotsk, which slopes at a certain angle toward the Kuril Islands."

Thus, not only evidence of geological catastrophes of the past, but some kind of signal from the future has been hoisted aboard the ship, the newspaper continued. Here is one of the expedition's trophies -- an odd-shaped rock fragment of yellowish colour. This is a valuable phosphorus-containing raw material. The find has aroused special interest in Sakhalin, since the island region is forced nowadays to bring large quantities of mineral fertilizers from the continent. Valuable samples have for the first time been hoisted from the bed of the Sea of Okhotsk in such large volumes. This may very well prove to be a new underwater deposit.

/12955
CSO: 1865/102

Briefs

'OKEANOLOG' MINISUBMARINE OPERATIONAL--The first minisubmarine in the Soviet Far East, "Okeanolog", (Oceanologist) has been made operational. Its crew's unique assignment is to inspect the underwater foundations and supports of offshore drilling platforms in the North Sakhalin oil fields. In addition, the minisub is to survey the sea floor and find flat areas for new drilling platforms. The minisub will also be used for scientific research in the Sea of Okhotsk. The submariners will photograph the seabed and survey the foundation of the underwater Kuril Ridge. The minisub has come in quite handy for marine biologists, too. It has helped them cultivate their seabed "kitchen gardens" where they grow edible laminaria. [Text] [Moscow MOSCOW NEWS in English No 26, 1986 p 10] 12955

CSO: 1865/37-E

UDC 550.84+552.31

UPPER MANTLE HETEROGENEITY AND COMPOSITION OF PRIMARY OCEAN ISLAND MAGMAS

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 86
(manuscript received 4 Dec 85) pp 74-80

[Article by L. N. Kogarko, Geochemistry and Analytical Chemistry Institute imeni V. I. Vernadskiy, Moscow]

[Abstract] Concepts concerning the heterogeneity of the earth's upper mantle with respect to rare and scattered elements have been developed in recent years. Heterogeneity of mantle sources has been most clearly established for ocean islands and the basalts of the mid-oceanic ridges and trenches. The question arises of the relationships between the composition of primary magmas of ocean islands and the distribution of rare and scattered elements in the mantle. Data from some 2,000 analyses of alkaline basalts on ocean islands reported in the literature plus rock materials collected by the authors in the South Atlantic during the 20th cruise of the research vessel "Akademik Kurchatov" were used. A study of the analyses indicated that the mantle sources beneath these islands are rich in rare lithophilic and light rare earth elements. Isotope studies of alkaline-basalt series from the Grand Canary, Saint Helena and Tristan da Cunha areas indicate different mantle sources for the three areas. Manifestations of alkaline magmatism during geological time are intimately related to the heterogeneity of subcrustal zones. The agreement of time of appearance of alkaline magmatism on the earth with the development of mantle substrate heterogeneity confirms the genetic relationship between these phenomena. Figures 4; references 20: 5 Russian, 15 Western.

6508/12955
CSO: 1865/1

UDC 548.4+552.321.6

TEMPERATURE CONDITIONS FOR ROCK CRYSTALLIZATION IN OPHIOLITES OF OCEAN-CONTINENT TRANSITION ZONE

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 86
(manuscript received 4 Dec 85) pp 142-147

[Article by V. A. Simonov, Geology and Geophysics Institute, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] Results are presented from studies of ophiolites collected by the author in the field in 1982-1984 using thermobarogeochemistry methods. The specimens were taken from the eastern margin of the USSR. A sequence of rock formations from ultrabasic through basic to acid was observed over geological time and with transition to reduced melt temperature. It was found that the ophiolite gabbros crystallized from melts at 1250-1260°C. The ultrabasic effusives had the highest formation temperatures, 1290-1320°C. Basic effusives had formation temperatures of 1250-1280°C, close to the crystallization temperature of the gabbros. The acid rock was crystallized at temperatures from 1100°C to as low as 700°C for the granitoid series. In the picrite group, constant temperature conditions were observed without a significant decrease in temperature with transition from intrusive to near-surface formations. The temperatures of this group were around 1420-1450°C. Figures 2; references: 6 Russian.

6508/12955
CSO: 1865/1

UDC 550.84+552.31

OCEAN FLOOR MAGMATISM AND PROBLEMS OF LITHOSPHERE FORMATION

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 7, Jul 86
(manuscript received 4 Dec 85) pp 81-85

[Article by L. V. Dmitriyev, Geochemistry Institute, USSR Academy Sciences, Moscow]

[Abstract] During the last five to ten years, petrology and geochemistry have developed rapidly, providing quantitative criteria for evaluation of geodynamic conditions of development of magmatism. This article discusses recent data on magmatism of the ocean floor. The following major geological structures are noted: the ocean floor with its trenches and mid-ocean ridges; volcanic islands and underwater volcanoes; aseismic ridges; and the active margins with troughs, island arcs and boundary seas. The data indicate that processes involving mixing and homogenization of mantle matter do not participate in the formation of mantle magma levels. This conclusion contradicts the common assumption of convection in the mantle, which is thought to be the main motive force in lithospheric plate tectonics. Figures 2; references 14: 10 Russian, 4 Western.

6508/12955
CSO: 1865/1

UDC 551.24.03

NATURE OF WESTERN PACIFIC TRANSITION ZONE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 1, Sep 86 (manuscript received 4 Feb 86) pp 570-573

[Article by V. I. Ilichev, academician and Yu. V. Zhevelkin, Pacific Ocean Oceanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] The inconsistency of the subduction model in the region of the Western Pacific transition zone requires formulation of a new, less contradictory model of deep processes and mechanisms of interaction between the continental and oceanic plates. Comparative data on the structure and spatial positioning of the Mid-Atlantic Ridge and Western Pacific transition zone were used to evolve alternative models of the zone. The authors postulate that the Mid-Atlantic Ridge and the Western Pacific transition zone are elements of a single planetary structure of Late Meso-Cenozoic activation. The Meso-Cenozoic stage of activation of this structure apparently resulted from the latest impulse of expansion of the earth. The data presented on the similarity of elements in the structure of the Mid-Atlantic Ridge and Western Pacific transition zone provide a means for solution of another problem as well. The sequence of major events in the Phanerozoic, identical for the Atlantic and Pacific segments of the earth, indicates a single era of activation of belts of transform faults and active zones between faults for the entire earth and may be the mechanism which unites geological events in both hemispheres. Figures 2; references 9: 5 Russian, 4 Western.

6508/12955
CSO: 1865/52

UDC 551.466.31

NUMERICAL EXPERIMENTS IN SWAMP TEST SYSTEM BASED ON SPECTRAL MODEL OF WIND WAVES

Kiev DOKLADY AKADEMII NAUK SSSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI OCEAN in Russian No 9, Sep 86 (manuscript received 29 Dec 85) pp 8-12

[Article by V. V. Yefimov, V. G. Polnikov and Ye. N. Sychyev, Marine Hydrophysics Institute, Ukrainian Academy of Sciences, Sevastopol]

[Abstract] Results are presented from calculations using th SWAMP test system for a model developed at the authors' institute. The results obtained indicate that the model used corresponds to the level of models required by the SWAMP project. The model of wind wave evolution is an energy balance equation for the wave components in spectral form. A more detailed

analysis of the calculations is promised for a future publication. Figures 2; references 5: 4 Russian, 1 Western.

6508/12955
CSO: 1865/50

UDC 551.243.037:553.981(265.5)

METHODS FOR STUDYING OIL AND GAS CONTENT OF VOLCANOGENIC BELT AS EXEMPLIFIED BY FAR EASTERN SEAS

Moscow SOVETSKAYA GEOLOGIYA in Russian No 9, Sep 86 pp 88-89

[Article by L. E. Levin, A. N. Virta, S. V. Klubov and A. V. Rezvaiyapov, All-Union Scientific Research Institute of Foreign Geology]

[Abstract] The results of many years of field and laboratory studies, including 220 analyses of chemical composition and 900 analyses of physical properties, and the interrelationship between geodynamic events and the trends of volcanism and changes in petrologic characteristics and physical properties of rock were investigated. Volcanogenic belts surrounding the Far Eastern Seas of the USSR were studied from the Komandorskiye Islands to the northern regions of the Sea of Japan, including new data on the Kuril Islands. A geological and petrological description of the cross section is presented. The distribution of collector rock in the cross section and its spatial distribution over the volcanogenic belt of the Far Eastern Seas as a function of the nature and direction of evolution of the individual parts of the area is described. The geodynamic situation is shown to control the propagation of collector rock throughout the entire area of the contemporary active ocean margins and adjacent transitional areas. Analysis of the results of the authors' years of field and laboratory work is said to be primarily of methodological significance as one element in overall studies directed toward evaluation of the prospects for finding oil and gas in sedimentary basins, the structure of which includes volcanogenic zones of any nature and type. Figures 1; references 13: 12 Russian, 1 Western.

6508/12955
CSO: 1865/44

UDC 551.241

NEW DATA ON STRUCTURE OF EARTH'S CRUST AND SEISMICITY OF BASINS IN ATLANTIC AND INDIAN OCEANS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 [manuscript received 4 Jun 85] pp 1448-1451

[Article by Yu. P. Neprochnov, V. V. Sedov, A. A. Petryashin, L. G. Avetisyan, B. B. Grinko, A. A. Ostrovskiy and B. V. Khmelyov, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] Geological and geophysical research in six test ranges was carried out in late 1983-early 1984 on the 31st cruise of the "Dmitriy Mendeleyev" (Cape Verde, Brazilian and Cape Basins in the Atlantic Ocean, Mozambique and Central Basins in the Indian Ocean). The literature gives very little information on crustal structure in these basins. Deep seismic sounding was with self-contained bottom seismographs and powerful sound sources. Horizontal homogeneity of the crust was studied in three of these ranges by running mutually perpendicular deep seismic sounding profiles. The Cape Verde Basin has the following parameters: sedimentary layer -- velocity 1.9 km/s, thickness 0.3 km; second layer -- velocity 4.4 km/s, thickness 0.9 km; third layer -- velocity 6.7 km/s, thickness 4 km; Moho -- velocity 8.1 km/s; total crustal thickness -- 5.2 km. [The corresponding parameters are given for each of the other test ranges.] In general, the crust in each of these basins has structural features in common (three-layer structure, thickness of 5-8 km, nearly the same velocities of seismic waves in the layers), but there are distinctive features caused by the geological history of their formation and interplate tectonics. There is an anomalous crustal section in the Brazilian Basin. Figures 2; references 9: 7 Russian, 2 Western.

5303/12955
CSO: 1865/135

UDC 911.2:581.5(261.2 Barents Sea) (26.03-04)

ECOLOGICAL AND GEOGRAPHICAL PROBLEMS OF NORTHERN SEAS (IN EXAMPLE OF BARENTS SEA)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian No 5, Sep-Oct 86 [manuscript received 16 Sep 85] pp 35-39

[Article by G. G. Matishov, Murmansk Marine Biological Institute, Kola Affiliate, USSR Academy of Sciences]

[Abstract] Among the seas of the Arctic Ocean the Barents Sea is characterized by the most extensive shelf, a lengthy polar front and an abundance and diversity of plant and animal life. Its rich fauna attracts enormous numbers of Atlantic fish for feeding. The penetration of the warm waters of the

North Atlantic Current is largely responsible for its favorable ecological conditions. Its physiographic and ecological characteristics are also influenced greatly by the complex sea floor topography. Unlike other shelf seas of the USSR the floor has highly dissected relief and abrupt changes in depth (Fig. 1 is a map of the geomorphological provinces of the Barents Sea shelf; Fig. 2 is a map of reconstruction of the glacier cover of the region in the Late Pleistocene). Past, present and future ecosystems cannot be understood without making full allowance for geomorphological factors. The great contribution of events in the glacial period to the present-day geomorphological and ecological conditions is explained, especially the species composition and distribution of flora and fauna. Alternating advance and retreat of glaciers, coolings and warmings, freshening and salinization, exerted a great influence on evolution of the animal and plant world. In the Barents Sea there are a great number of differently organized ecosystems which are governed by abiotic and biotic factors. The highly productive coastal biocommunes are of particular importance. However, there are many ecological concerns. During recent years there has been a marked reduction in the ranges and numbers of valuable commercial fish in northern seas. There has been an impoverishment of organisms valuable for food and unprecedented successions of species of little value. The pollution of the sea by petroleum and petroleum products is having a destructive effect on all links in the biological chain. Petroleum films disrupt the radiation regime and gas exchange with the atmosphere and oxygen balance and slow the rates of photosynthesis, especially in the surface microlayer, and thus reduce the productivity of the water body as a whole. Petroleum prospecting sometimes disrupts the migration routes of valuable commercial fish and causes the death of many. These and other changes dictate a broadening of ecological monitoring of the Barents Sea and the organization of measures for preserving the plant and animal life in that area. Figures 2; references: 11 Russian.

[illegible]
[illegible]

UDC 550.341.6+551.24?

EFFECTIVENESS OF OCEANOGRAPHIC METHOD IN EARTHQUAKE PREDICTION

[illegible] VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 19 Mar 85) pp 101-104

[Article by G. G. Fedoseyev, Marine Geology and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] Tide gauges can be used in registering vertical movements of the land and also afford possibilities for predicting earthquakes, although much additional work must be done to realize these possibilities. The oceanographic method already makes it possible to detect anomalies in vertical movements of the land of not less than 1-2 cm. An expression has been derived for computing the effective radius of the method. The method can

be used in predicting relatively close earthquakes and could probably be effective in predicting earthquakes with M $\geq$ 7.0 if the distance between level stations does not exceed 80 km. It is highly important that the observation points be situated as close as possible to the epicentral zone of an anticipated earthquake. Bottom pressure sensors are now available which can measure ocean level distant from its shores with a high degree of accuracy, thereby making it possible to study vertical movements of both the land and ocean floor, in the latter case inaccessible for other observation methods. It is probably possible to detect earthquake precursors in this way. Especially in the Far Eastern region the use of bottom pressure detectors may become an effective method for predicting earthquakes. References 14: 10 Russian, 4 Western.

5303/12955
CSO: 1865/105

UDC 550.834:551.214.6(571.645)

STRUCTURE OF KRATERNAYA BAY VOLCANIC DEPRESSION (KURIL ISLANDS) BASED ON SEISMOACOUSTIC RESEARCH DATA

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 86 (manuscript received 12 May 85) pp 96-101

[Article by V. I. Bondarenko, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] Detailed seismoacoustic research was carried out in 1983 in Kraternaya Bay on Yankicha Island in the Ushishir group (a map of the region accompanies the text). Echo sounding and continuous seismic profiling made it possible to clarify the origin of the volcanic depression of Kraternaya Bay. The thickness of the sedimentary layer on the floor of the bay is 80-120 m (volume $1.9 \cdot 10^7$ m^3). The relatively small extent of the bay and the findings on structure of the sedimentary filling and its basement relief indicated that the bay is of an explosve origin. The kinetic energy of the eruption was $1.5 \cdot 10^{23}$ erg. The history of development of the depression was defined. The strong explosive eruption resulted in formation of a crater 1.6 km in diameter with walls 150-500 m high. At the end of the eruption or somewhat later, at the point of surface emergence of the incurrent canal, extrusive domes or a single dome of complex configuration appeared, probably accompanied by some sinking of the crater floor along an annular fault. There is basis for postulating that within the bay there are presently unknown underwater gas-hydrothermal vents associated with the annular fault. Figures 2; references: 13 Russian.

5303/12955
CSO: 1865/105

UDC 650.834:551.214(265.72)

PRINCIPAL STRUCTURAL CHARACTERISTICS OF VOLCANIC ZONE IN NEIGHBORHOOD OF KU LAO RE ISLANDS (SOUTH CHINA SEA) BASED ON CONTINUOUS SEISMIC PROFILING DATA

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 86
(manuscript received 31 May 85) pp 92-96

[Article by A. M. Nadezhnyy, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] Sea and land geological and geophysical research was carried out on the 16th cruise of the "Vulkanolog" in 1983 along the northeastern coast of Viet Nam, including the area of the Ku Lao Re and Bobai Islands. The volcanic cones on Ku Lao Re are made up of pyroclastic material of basaltic composition. Ku Lao Re and Bobai Islands are clearly of volcanic origin. An effort was made to clarify the relationship between the volcanic complexes on the islands and along the coast. Most of the information on the structure of the underwater part of the volcanic island zone and island-coastal relationships were obtained using continuous seismic profiling data. It was possible to detect an earlier unknown underwater continuation of the zone of recent volcanism on the South China Sea shelf which is spatially related to the manifestations of volcanism on Ku Lao Re and Bobai. The principal criteria used in discriminating volcanogenic formations on continuous seismic profiling seismograms are acoustic turbidity and irregular stratification of volcanogenic deposits associated with the arrhythmic character of the volcanic process. On the basis of the relationship of reflecting surfaces of different litho-stratigraphic complexes in this region it was found that the age of the volcanogenic deposits of the island volcanic zone appears to be Pleistocene-Holocene, whereas the age of coastal basalts is Pliocene. Figures 3; references 8: 7 Russian, 1 Western.

5303/12955
CSO: 1865/105

UDC 550.361+551.24

[illegible] OF GEOTHERMAL FIELD OF LITHOSPHERE IN SOUTHERN PART [illegible]

[illegible] SEYSMOLOGIYA in Russian No 5, Sep-Oct 86
[illegible] 23 Sep 85) pp 3-16

[illegible]in, A. V. Muravyev, Ya. B. Smirnov and V. M. [illegible] University; Geology Institute, USSR Academy of Sciences; [illegible], Far Eastern Scientific Center, USSR Academy of [illegible]

[illegible] observations had indicated the probable existence of [illegible] high heat flows in the southern part of the [illegible]. A specific study of this zone was therefore made on [illegible] "Vulkanolog" in 1983. Heat flow measurements [illegible] profiles with a length up to 170 km with profiles [illegible] of 40-50 km. Echo sounding and continuous seismic [illegible] by sampling of bottom sediments and geothermal [illegible] records of the geothermal gradient were obtained; [illegible] determination was 5-10%. All measurements were at [illegible] m. All collected heat flow data are tabulated. [illegible] 14 were in the abyssal part of the Komandorskaya [illegible] Basin and 1 in the fault bounding these structures. [illegible] flows were in "high" categories. The measurements [illegible] carry out geothermal regionalization. The heat flow [illegible] abyssal part of the basin at a distance of 25-45 km from [illegible] of the maximum heat flow approaches the basement [illegible] part of the Komandorskaya plate near its convergence [illegible]. The heat flow within the limits of the Komandorskiy [illegible] arc is less by a factor of 1.5 than in the Komandor-[illegible]. [illegible] of active deep faults is characterized by considerable [illegible]. Over most of the Komandorskaya Basin the distortions [illegible] inhomogeneities are usually a few percent, but [illegible] the basement rise they attain 20-40% or more. [illegible] correction is 15-20%, in deep basement depressions up [illegible] that magma hearths are present at depths as little [illegible] references 15: 8 Russian, 7 Western.

[illegible]
[illegible]

UDC 551.465(267.32)

DYNAMICS AND STRUCTURE OF WATERS IN WESTERN PART OF GULF OF ADEN DURING WINTER MONSOON PERIOD

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 5, GEOGRAFIYA in Russian No 5, Sep-Oct 86 (manuscript received 15 Apr 85) pp 83-88

[Article by V. S. Arkhipkin, K. K. Zelenov and A. F. Maslov, Moscow State University]

[Abstract] Oceanological research was carried out in a test range in the western part of the Gulf of Aden on the 14th cruise of the "Akedemik Petrovskiy" in the period November 1983-January 1984; a run was also made through Bab el Mandeb Strait. A hydrological and hydrochemical survey was made to the bottom. The temperature and salinity fields were analyzed at 17 horizons in order to clarify the structure of circulation of waters in the test range. Computations were made using a regular rectangular grid with an interval 5' in latitude and longitude. The studied area is characterized by active dynamics of its waters with current velocities exceeding 100 cm/s. Westerly currents turn sharply southward in the entire thickness of Gulf of Aden waters. As a result of interaction with bottom relief the currents meander and an anticyclonic gyre develops at intermediate depths over a volcanic rise. Intensive vertical movements are present. The thermohaline stratification of waters from the 300-m horizon and to the bottom is formed by the interaction of two main water masses (intermediate waters of Arabian Sea origin and Red Sea intermediate and deep waters). Red Sea waters are propagated in two main flows in the layer 400-600 m and below 800 m. Most of these waters enter the range from the south, describing an arc along the African coast and subjected to considerable transformation. Figures 3; references 10: 8 Russian, 2 Western.

5303/12955
CSO: 1865/103

UDC 261.26:551.782(265)

NEOGENE PALEOCLIMATE IN PACIFIC OCEAN SUBARCTIC REGION DETERMINED FROM STUDY OF DIATOMS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 11, Nov 86 (manuscript received 17 Sep 85) pp 27-34

[Article by T. V. Oreshkina, Geology Institute, USSR Academy of Sciences, Moscow]

[Abstract] The paleoclimate of the northwestern part of the Pacific Ocean was reconstructed on the basis of diatom analysis almost 25 years ago. The stages in climatic changes and changes in sea level in the Pleistocene were determined by the actualism method. This was followed by similar work for

a number of other areas by the same method. However, the actualism method cannot be used in reconstruction of paleoclimate of more ancient periods of geological time because modern species with a known ecology were rare or absent at that time. Retrieval of climatic trends for the Neogene or Paleogene must be based on detailed stratigraphic research. Now the great amount of data on the stratigraphic distribution of diatoms accumulated in the DSDP can be used as a basis for the retrieval of temperature fluctuations from the quantitative ratio of warm- and cold-water species. Diatoms can now be used successfully in interpreting climatic changes and paleoceanography of the Late Cenozoic, especially for the northern latitudes of the Pacific Ocean where they are the sole group of microplankton widely occurring in sediments. Now for the first time Neogene diatoms have been used in a paleoclimate reconstruction. The author reviews all the available data and demonstrates that during the Neogene in the North Pacific Ocean region there was a repeated change in different ecological associations in time and space. The climate in that region changed from the first half of the Middle Miocene to the end of the Pliocene from subtropical to subpolar. These and other findings indicate that changes in the ecological structure of diatom complexes are a reliable indicator of environmental changes. Further work along these lines will make it possible to solve a number of problems in Neogene paleooceanography. Figures 2; references 30: 9 Russian, 21 Western.

9303/12955
CSO: 1865/123

UDC 550.34.01

SEA RESONANCE VIBRATIONAL SOURCE OF SEISMIC WAVES

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 9, Sep 86
(manuscript received 22 Jan 85) pp 111-115

[Article by G. V. Yegurev and A. A. Zuyev, Geology and Geophysics Institute, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] When using the vibrational method for deep seismic sounding on the shelf and in the continent-ocean transition zones it is feasible to use sea vibrational sources of seismic waves; they are more transportable than land sources of the same power. The requirement is for the generation of waves in the frequency range from 4 to 12 Hz with a total radiated power up to 100 kWh or more. The optimal depth of submergence of such a source is 1/4 the wavelength. A fixed depth of source submergence can be optimal only for one radiation frequency. [A whole series of desirable parameters for such a source is examined.] The strength of the signal radiated from the source must be such that the signal-to-noise ratio at reception points is satisfactory when the duration of source transmission is 1-2 hours. A possible simple variant of such a source is described (a figure shows mechanical and electrical models of such a source). A cylindrical dome is lowered over the ship's side. The initial air volume in this dome ensures

resonance at the maximum frequency in the used frequency range. The dome is open at the bottom and the air which serves as the pneumatic spring is bounded by the upper base of the dome and the water surface beneath it. There are inlet and outlet valves whose operation is automatically synchronized with air variations under the dome. The operating principle is described; the principal characteristics of the proposed vibrator are defined, including their dependence on frequency and the law of change of vibrator resonance frequency with time. A table summarizes the principal parameters of such a vibrator for the frequency range 4-12 Hz for use in deep seismic sounding at sea. Figures 1; references: 5 Russian.

5303/12955
CSO: 1865/128

UDC 552.14:551.352

WEIGHTING EFFECT: IMPORTANT FACTOR IN SEDIMENTATION UNDER ABYSSAL CONDITIONS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 4, GEOLOGIYA in Russian
No 5, Sep-Oct 86 (manuscript received 20 Nov 85) pp 67-75

[Article by B. A. Sokolov and A. I. Konyukhov, Moscow University]

[Abstract] Recent research has confirmed the idea expressed by the authors more than 10 years ago that deposits forming in abyssal seas and oceans are unconsolidated, a phenomenon given the name "abyssal diagenesis paradox." It is contended that this unusually slow consolidation of sediments is attributable to a considerable degree to what might be called the "weighting effect," a correlary of the Archimedes principle. Failure to take this factor into account accounts for the long-prevailing notion that life is impossible under abyssal conditions, where enormous pressures prevail. The weighting effect exerts a great influence on the distribution of sedimentary strata and on their bedding conditions. The following aspects of this problem were considered: weighting effect and diagenesis; weighting effect and transport of sediments by currents; weighting effect and formation of turbidites; weighting effect and flysch formation; weighting effect and growth of reefs; weighting effect and accumulation of Fe-Mn nodules; weighting effect and overthrust dislocations. The weighting effect unquestionably exerts an effect on sedimentation and diagenesis and plays an enormous role in the formation of thick sedimentary layers in seas and oceans. This effect must be taken into account in paleogeographic reconstructions and in clarifying the patterns of distribution of minerals in sedimentary strata. Figures 5; references 13: 12 Russian, 1 Western.

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CSO: 1865/117

UDC 553.982.23.053(262.5-16)

CLINOFORMS ON NORTHWESTERN BLACK SEA SHELF, THEIR GENESIS AND CONDITIONS FOR FORMATION OF PETROLEUM AND GAS

Moscow GEOLOGIYA NEFTI I GAZA in Russian No 10, Oct 86 pp 46-53

[Article by V. I. Gromin, O. I. Rogoza, V. P. Chaitskiy and A. A. Shimanskiy, Crimean Affiliate, Marine Geophysics Scientific Research Institute]

[Abstract] Clinoforms are extensively developed on the northwestern shelf of the Black Sea. Depending on sedimentation and tectonic conditions, nonanticlinal traps of the lithological and stratigraphic types may be associated with clinoforms. In order to evaluate the possibilities of using clinoforms as potential hydrocarbon traps it is necessary to determine not only their geometric forms, but their genesis as well. Clinoforms formed during periods of relative rising of sea level, accompanied by the inflow of terrigenous material, are of the greatest interest as petroleum and gas traps. A seismostratigraphic analysis was made of time sections obtained by the common depth point method. The seismic materials collected made it possible to study the history of geological development of the Mesozoic-Cenozoic sedimentary cover. Some of the clinoforms found in deposits of Cretaceous and Paleogene age were formed under conditions of a predominantly rising sea level interrupted by brief regressions, whereas others were formed during periods of relative dropping down of sea level. Clinoforms of the first type are characterized by a gradual shifting of the coastal bedding of layers in the direction of the land, whereas clinoforms of the second type are characterized by shifting of the layers along the dip. Clinoforms of the first type therefore may have a favorable combination of traps and caprock which formed in a single cycle of advance of the sea onto the land. In the second type the traps during the entire cycle of retreat and stabilization of sea level were subjected to subaerial processes, lessening their significance as potential traps. Figures 3; references: 6 Russian.

5303/12955
CSO: 1865/124

UDC 550.372

ELECTROMAGNETIC INDUCTION IN SPHERICAL EARTH CONTAINING OCEANS AND CONTINENTS IN ELECTRICAL CONTACT WITH UNDERLYING SECTION: THEORY, METHOD, EXAMPLE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 10, Oct 86 (manuscript received 21 Aug 85) pp 51-65

[Article by B. Sh. Zinger, A. V. Kuvshinov and E. B. Faynberg, Terrestrial Magnetism, Ionosphere and Radio Wave Propagation Institute, USSR Academy of Sciences]

[Abstract] The problem of allowance for the influence of surface inhomogeneities on the results of deep electromagnetic sounding is one of the most important in geoelectrics. In an effort to solve this problem, the character of electromagnetic induction in a spherical earth containing oceans and continents, the authors set forth the theoretical principles of the so-called iterative-dissipative method as applicable to the problem and the basic principles for its numerical realization. The model used consisted of a thin inhomogeneous surface layer in galvanic contact with the underlying stratified section. The current system induced by a uniform magnetic field in a model with a real distribution of surface conductivity was computed. A section with a power law conductivity change was used as the underlying surface. The employed model reveals that there are considerable leakage currents from the inhomogeneous surface layer despite high transverse resistance of the crust and upper mantle. A specific example of the numerical modeling is given. The example confirms the important role of leakage currents in the formation of electromagnetic fields induced in the earth and the need for taking these currents into account in deep electromagnetic soundings. Figures 3; references 11: 6 Russian, 5 Western.

5303/12955
CSO: 1865/126

INTERNATIONAL SEISMOLOGY SEMINAR IN DUSHANBE

Moscow PRAVDA in Russian 9 Oct 86 p 6

[Text] Moscow PRAVDA carries, under the headline "Against the Elements", an 800-word report on the opening of a 6-day international seismology seminar in Dushanbe on 8 October devoted to Problems of Predicting Earthquakes and Planning Measures to Minimize the Damage They Cause." The seminar was convened by the Office of the UN Disaster Relief Coordinator in conjunction with UNESCO and a number of Soviet organizations and attended by scientists from more than 40 countries and international organizations. A. Aleksandrov, president of the USSR Academy of Sciences, is cited as saying in his message to the seminar: "Your seminar is meeting at a troubled time, when the world is faced with the serious threat of the destruction of human civilization as the result of a nuclear catastrophe. The present development of events shows that scientists throughout the world, including seismologists, can and must make their contribution to preventing a nuclear catastrophe. The achievements of world seismology today make it possible to efficiently verify observance of an agreement banning nuclear explosions. This provides a sound scientific basis for such verification and for nuclear powers to subscribe to the moratorium on nuclear tests announced by the Soviet government."

/12955
CSO: 1865/49-E

GEODYNAMIC MODEL OF CRIMEA WILL CONTRIBUTE TO ECOLOGY

Moscow MOSCOW NEWS in English No 26, 1986, p 10

[Article by Valentin Dubin]

[Text] A geodynamic model of the Crimea has been made by scientists at the All-Union Hydrogeology and Engineering Geology Research Institute.

This world's first model of a territory with a tense water balance makes it possible to size up the hydrogeological and geological engineering state of the peninsula's territory, to forecast its changes under the impact of economic activities and to issue recommendations for the adoption of well-grounded decisions.

The following is what Genrikh Vartanyan, director of the institute, D. Sc. (Geology and Mineralogy), has to say concerning this.

* * *

Much is being done in the Soviet Union in terms of environmental protection and to foster a caring attitude towards natural resources. But it is not always that people can harmonize their requirements with nature's capabilities. There is still a lot we don't know about the intricate interconnections in nature and mistakes we make in our economic activities do not go unnoticed -- especially those which disrupt these interconnections, upset the natural balance and cause irreversible harm to the environment. Our institute's work is devoted to studying and preventing undesirable processes deep within the earth caused by man's economic activities. The geodynamic model of the Crimea was also developed in accordance with systematic research into environmental protection.

The idea belongs to Professor Yevgeny Kozlovsky, the USSR Minister of Geology. Large-scale agricultural development and hydroengineering construction are under way in the Crimea, a health-resort center. The Minister suggested that a geodynamic model of the peninsula should be developed for the comprehenisve fulfillment of these missions.

What does this actually mean?

In accordance with a specially devised mathematical program, using the data of perennial observations on the hydrogeological state of the Crimea, geologists, mathematicians and electronics experts of the institute reproduced the hydrogeological and geological engineering conditions of the Crimean Peninsula beginning with 1960 and worked out forecasts through 2000. This made it possible to identify the uniformities of changes in the water conditions of the territory and establish the degree of influence on it by the natural factors and man's activities. For instance, the influence of geological processes taking place under the impact of external factors: landslides, mudslides, abrasions and karsts. There is a fairly large number of landslide-prone sites in the Crimea, affecting recreation localities, vineyards and building structures. Using the methods of forecasting specially devised at the institute, scientists have developed dynamic models that not only reveal the degree of the Crimean territory's vulnerability to landslides, but also making it possible to predict where they may take place up till the end of the century. This will make it possible to establish the advisability of building facilities on any given area of the Crimean Peninsula.

The geodynamic model will have a particularly important role to play in the further development of agriculture on the peninsula. Using it, it is possible to decide on where to locate water wells without detriment to the natural water exchange established in the Crimea and without disrupting the region's water balance. The irrational use of wells frequently leads to the salinization of fresh-water resources, whereas ill-advised irrigation of farmlands often results in overlooking such negative consequences as a rise in the level of underground water or subflooding. The model will make it possible to forecast and avert these processes in due time.

In this way, knowing the potential of nature reflected in the geodynamic model and the plans for the region's development, it is possible to harmonize man's requirements and nature's capabilities.

The geodynamic model of the Crimea has been accepted as the basic one in the USSR and highly assessed by the international geological community. The experience obtained on the basis of its development and operation will be extended to other intensively developed regions of the country.

Scientists from the institute and the Tsentrgeologia Association, for instance, are already constructing a model of the Moscow artesian basin which will be used by all the hydroeconomic services.

The Crimean model has been widely acclaimed internationally as an example of a rational approach to running mankind's economic activities without detriment to nature.

/12955
CSO: 1865/37-E

BRIEFS

PATTERN OF OIL AND GAS DEPOSITS DISCOVERED--Soviet oil experts discovered that commercially important oil and gas deposits are located in a circular pattern -- around large geological structures that took shape long ago, or around mountain massifs, such as the Caucasus, for example. At present there are some 600 major deposits in the world and the location of all of them, as a rule, corroborates this hypothesis. Experts believe that this fact is crucial to the future search for oil and gas. [Text] [Moscow TASS in English 16 Oct 86] 12955

CSO: 1865/36-E

UDC 528.942:553.411

COMPILATION OF GOLD PROGNOSIS MAP BASED ON LITHOLOGIC-STRATIGRAPHIC AND MAGMATIC FACTORS

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 9, Sep 88, pp 51-56

[Article by V. A. Zorayev, A. M. Sazonov and A. A. Ananyev, Tomsk Polytechnical Institute]

[Abstract] The authors suggest compilation of prognosis maps for gold ore prospecting in isolines of probability of finding gold based on lithologic-stratigraphic and magmatic factors. In contrast to previous studies, this method is based on a stereologic approach and statistical probability graph methods for processing geological information. Geological elements are computed over the area of a single sliding sector in the form of a circle superposed over the nodes of a regular grid on a medium-scale geological map. The stereologic principle is used for the measurements and analysis, essentially meaning that if a system of random planes, lines and points is placed in a model of a 3-dimensional two-phase structure, the ratio of the total area of intersecting cross-sections of particles of the second phase to the total area of intersecting planes, total length of sectors cut by the surfaces of these particles to the total length of sectors and the number of points falling on a phase particle to the total number of points in the system are equal to the ratio of the total volume of particles to the volume of a specimen. The method of compiling a prognostic map based on this method is described. A sample map is presented. Figure 1; references: 7 Russian.

8500/12955
CSO: 1865/21

UDC 622.24.051.6

DETERMINING EFFECTIVE SLUDGE PUMP TECHNOLOGY FOR DRILLING OF BOREHOLES WITH CASINGS IN SAND AND GRAVEL

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 9, Sep 86, pp 129-134

[Article by Yu. A. Arsentyev, B. M. Botvin and V. Ya. Plostchadniy, Moscow Geological Prospecting Institute imeni Sergo Ordzhonikidze]

[Abstract] Drilling of boreholes in unstable sand and gravel can be done by driving the casing string while pumping out the solid plug with a reciprocating sludge pump. This article calculates the forces acting on a solid particle immersed in the fluid at the bottom of the string to determine an effective sludge pumping technology (ratio of sludge pump diameter to inside diameter of casing string, stroke length and speed), depending on particle size. The equations derived allow accurate selection of the optimal pumping technology as a function of particle size. This can increase the drilling rate by 10 or 20%. Figures 2.

6508/1295
CSO: 1865/21

UDC 550.832

ROCK-BREAKING TOOL FOR "STRELA-77" DRILLING MACHINE

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 9, Sep 86, pp 130-133

[Article by A. P. Karpinos, I. M. Mishonin and A. V. Tolmachev, Moscow Geological Prospecting Institute imeni Sergo Ordzhonikidze]

[Abstract] Effective drilling of ascending mine openings requires an increase in operational reliability of gear cutters. Experimental studies were performed of various designs of rock-breaking tools on an impact test stand modeling the operation of the tools under rolling and sliding conditions. Gear-type cutting tools with hard alloy inserts were designed on the basis of the experiments. Radial-thrust bearings were used to improve the reliability of cutters. Slime separators were used to prevent accumulation in the gap between the body of the bit, cutter shaft and cutter body. The new design was found to have increased service life at drilling rates up to 1.5-1.6 m/hr with axial loads up to 250 kN, advance per cutter about 250 m. The new design decreased drilling cost per meter by a factor of 1.3-1.5. Figures 2.

6508/1295
CSO: 1865/21

UDC 552.321.5.553.494.311

ILMENITE-TITANOMAGNETITE ORES OF KHARLOV DEPOSIT IN ALTAI. PROMISING SOURCE OF ALUMINUM-IRON-TITANIUM-VANADIUM RAW MATERIALS

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 8, Aug 86
(manuscript received 16 May 85) pp 48-55

[Article by L. I. Shabalin, Siberial Scientific Research Institute of Geology, Geophysics and Mineral Raw Materials, Novosibirsk]

[Abstract] The Kharlov deposit is among the most promising titanomagnetite deposits in southern Siberia; it is a gabbroic mass consisting primarily of differentiated olivine gabbroids. The major commerically valuable minerals are titanomagnetite and ilmenite, as well as plagioclase. The article discusses the chemical composition and possible means of processing these commercially valuable ore minerals. The commercial potential of the deposit is confirmed by its favorable geographic location near potential consumers in an inhabited area, the high titanium content of its ores, good potential for separating oxide ore minerals from nonvaluable silicate minerals in beneficiation, low content of impurities in the ores, high content of vanadium in the titanomagnetite and of alumina in the plagioclase. There are significant quantities of plagioclase in the ores and good workability of the ores within the deposit, as well as favorable placement of ores at or near the surface. References 22: Russian.

6508/12955
CSO: 1865/45

STRENGTHENING AND EXPANSION OF MINERAL RAW MATERIAL BASE OF NATION, INCREASING EFFECTIVENESS AND QUALITY OF PREPARATION OF MINERAL RESERVES--A MAJOR TASK

Moscow SOVETSKAYA GEOLOGIYA in Russian No 9, Sep 86 pp 3-8

[Unsigned editorial]

[Abstract] The June 1986 Plenum of the CC CPSU approved M. S. Gorbachev's call for accelerated social and economic development of the nation and strengthening of peace and the 5-year plan for economic and social development of the USSR in 1986-1990. In accordance with the resolutions of the 27th CPSU Congress, the 5-year plan calls for further strengthening and development of the mineral raw material base of the nation, increasing the effectiveness and quality of preparation of assimilation of proven reserves of useful minerals. Plans call for increasing the total volume of geological prospecting work by a factor of 1.4 in comparison to the 11th 5-year plan, capital investments in oil and gas by a factor of 1.8, deep drilling by a factor of more than 1.5, and construction and installation work by a factor of 1.3. Some 60 to 80% of total allocations in the branch will be for purposes of strengthening and expansion of the raw material base

of existing enterprises. A major task is to find large deposits of oil and gas. In the Ukraine, the Caspian area and in the northwestern Siberian province, the search for deposits will be extended to depths of 5-7 km. Performance of these tasks will be impossible without a significant improvement in the organization of efforts, acceleration of the introduction of the advances in geological science and improvement in search and prospecting methods, including those allowing direct prediction of hydrocarbon deposits. In the field of geological research it is important to improve the quality of large-scale geological mapping used as the basis for prediction, prospecting and exploration. In geochemical research steps must be taken to standardize methods; particular attention must be given to effective combining of methods for prospecting and exploration based on "necessary and sufficient" principles. Much work lies ahead in the improvement of economic mechanisms, restructuring of which has been proceeding too slowly. The essence of the suggestions developed for the improvement of the economic mechanism is as follows: working out of an effective cost control mechanism based on stable standards of the cost of geological assignments; improvement of the effectivenss of planning by standardized planning methods, sharp reduction in the number of indicators approved from above, with independent development of annual plans for economic and social development by organizations, and changeover of geological production associations to full independent accounting. It is highly important not to waste time, with a continuous increase in rates of progress.

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CSO: 1865/44

UDC 550.098.33

ELECTROENERGETIC SEISMIC EFFECT

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 (manuscript received 26 Aug 85) pp 1342-1346

[Article by N. K. Pleskach, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences, Moscow]

[Abstract] A number of continuous, virtually monochromatic seismic oscillations with an amplitude A < 10 m have been discovered in the frequency region 1-7 Hz in the earth's seismic background. These oscillations constitute a previously unknown type of seismic waves. They have been designated quasiharmonic microseismic oscillations (QMO). The author first detected this phenomenon in 1977. A study made over the period 1978-1983 in different regions of the USSR has clarified their spatial-temporal properties and their physical nature. The observations were made using a specially designed three-channel station operating in the range 1.5-10 Hz. QMO have been detected in the seismic background in both the Z- and in the NS- and EW-components. At an individual point the number of discriminated QMO is dependent on the characteristics of the background, observation time, geographical location and such properties as intensity, degree of

continuity. The observed properties of QMO, their [illegible] changes, amplitudes and frequencies and the rigorous [illegible] frequencies to the frequency of the variable current of [illegible] are evidence of a technogenic nature of QMO; [illegible] is possible only by processes associated with the electric [illegible]. They appear to be associated with powerful installations [illegible] electric power, such as generating stations of different types. Figures 1; references 4: 2 Russian, 2 Western.

[illegible]

UDC 551.24+550.34

[illegible] OF SEISMOFOCAL ZONE OF ACTIVE CONTINENTAL MARGIN

[illegible] SSSR in Russian Vol 290, No 6, Oct 86 [illegible] received 13 Jun 86] pp 1339-1342

[Article by S. S. Zonin and S. Ye. Zharinov, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences, Moscow; Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Petropavlovsk-Kamchatskiy]

[Abstract] The active margins of continents have a number of structural and [illegible] features in common. There is evidence of a unified tectonic process determining the structural features and geophysical fields of active margins. Although this process is usually associated with subduction of the oceanic lithosphere, subduction cannot explain certain features and [illegible] geodynamic models which have been proposed cannot be regarded as universal. Accordingly, a new approach to the modeling of the geodynamics of the active continental margin is proposed in which upthrust movements along a fault seismofocal zone are assumed to be the structure-forming mechanism. The model can be used in describing the mechanism of formation of the active margin in the process of slow tectonic movement of continental and oceanic blocks along a fault seismofocal zone and the [illegible] crustal movements accompanying this process. The model can be used in calculating tectonic compression and effective parameters of the medium. Usefulness of the model is illustrated in a specific case in which the nature of free surface displacements corresponds to the principal relief forms of the continental margin (island arc uplift, depression, abyssal trench and marginal sea), with the amplitude and scale of the displacements being consistent with the characteristic dimensions of the morphostructures. The proposed tectonic mechanism, different from the subduction mechanism, is effective in explaining a number of features which would remain unexplained if the subduction model was applied. Figures 2; references 15: 14 Russian, 1 Western.

[illegible]

FIRST GENERALIZATION OF DATA CHARACTERIZING GOLD ORE DEPOSITS IN ARMENIA

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian
No 3, May-Jun 86 p 72

[Book review by N. V. Petrovskaya]

[Abstract] The monograph "Gold Ore Formations in the Armenian SSR" (ZOLOTORUDNYYE FORMATSII ARMYANSKOY SSR), by Sh. O. Amiryan (Yerevan, Izdatelstvo AN ArmSSR, 1984, 306 pages), is the best book on this subject yet to appear. The first part gives a concise review of the history of discovery and study of gold ore formations in Armenia. This is followed by a description of the geology of structural-metallogenetic zones in which gold deposits and shows are found. The second part, the largest and most important, gives thorough descriptions of the geology and mineralogy of deposits representing all the defined types of gold mineralization. The third part gives a summary of the ore-forming minerals and the general characteristics of ore genesis. The monograph is structured in such a way as to facilitate its use by readers. The pertinent minerals are described on the basis of modern mineralogical research methods. Particular attention is given to the proper classification of gold deposits, with a critique of earlier schemes, which were defective in a number of ways. Important conclusions are drawn concerning the formation of gold ore deposits in Armenia in the range of moderate and shallow depths, the stage nature of ore-forming processes and the participation of ion and colloid solutions in the[illegible] The book makes an important contribution to the theory of gold mineraliz[illegible]ion and clearly defines the practical applications.

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CSO: 1865/104

UDC 550.348

COMPREHENSIVE METHOD FOR DEFINING SEISMOGENIC ZONES

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian
No 3, May-Jun 86 (manuscript received 5 Nov 84) pp 63-68

[Article by T. O. Babayan, Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] Since study of seismogenic zones makes it possible to predict the place and intensity of earthquakes it is important to clarify the seismogenic nature of tectonic dislocations, making use of their seismological and geological-tectonic criteria. This problem is clarified in the example of a region in Armenia. First the seismological criteria of seismicity are examined (localization of earthquake foci, positioning of epicenters of weak earthquakes along seismogenic zones, nature of pleistoseist regions of strong earthquakes, nature of redistribution of seismic stresses, change in rate of seismic stresses). Next the geological criteria of seismicity

are considered, such as degree of mobility along the zone of rupturing of sectors of the earth's crust and the faults separating them not only in the present stage, but also in the geological past, as well as the degree of fragmentation or nonuniformity, brittleness or plasticity of these sectors and age of seismically active structures. Secondary phenomena are also evidence of the seismogenic character of tectonic dislocations (such as paleoseismic and recent seismic dislocations). Geophysical criteria of seismicity include the nature of the recent and very recent crustal movements. There are also hydrogeological criteria of seismicity, such as the presence of mineral springs in different sectors of the seismogenic zone, the appearance or disappearance of springs, changes in ground water table or head, and others. By a generalization of these criteria it is possible to conclude whether particular tectonic dislocations are seismogenic (capable of generating earthquakes). Figures 2; references: 9 Russian.

5303/12955
CSO: 1865/104

UDC 551.311.3(45+57-13)

WIND-ENERGY CONDITIONS FOR TRANSPORT OF MINERAL SUBSTANCES IN SOUTHERN USSR

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian No 5, Sep-Oct 86 (manuscript received 25 Mar 85) pp 21-29

[Article by N. F. Glazovskiy, Soil Science and Photosynthesis Institute, USSR Academy of Sciences]

[Abstract] It is proposed that the energy characteristics of the wind (total energy, equivalent energy and stability of direction) be used in an analysis of conditions for atmospheric transport of mineral substances in the southern USSR. (Figures 1, 2, 3 are maps of total wind energy, equivalent energy and wind stability.) Total wind energy is indicative of the degree of the effect of the air flow on the underlying surface. Over the greater part of the arid zone of the USSR there is a predominance of wind energy from 30 to 70 10 J/year; the stability of wind energy direction varies from 2 to 95%. The equivalent wind energy is from 1.2 to $422 \cdot 10^8$ J/year, the greatest values being registered in mountain passes and some regions of the Caspian Sea coast. Over most of the studied area the equivalent energy is $10\text{-}50 \cdot 10^8$ J/year. The map of distribution of equivalent wind energy reveals that in general there is a movement of matter through the atmosphere from the central parts of the arid zone of the USSR toward its periphery. The compiled wind-energy characteristics and the regionalization based on them can be used in an analysis of salt transport and migration of pollutants, in a study of the genesis of sedimentary deposits and prediction of the movement of masses of sand and in the designing and operation of windmills. It is shown that in the upper part of the troposphere, at the tropopause, and in the summer, in the stratosphere, transport for the most part is from west to east. It was possible to ascertain the principal directions of transport in the lower troposphere and define regions of predominant "inflow" and "outflow" of matter. Figures 4; references 26: 25 Russian, 1 Western.

5303/12955
CSO: 1865/100

UDC 550.34.06.013.2

KAMCHATKA EARTHQUAKE OF 17 AUGUST 1983

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 86
(manuscript received 26 Jun 84) pp 75-89

[Article by V. P. Mityakin, S. G. Molotkov, O. A. Serova and P. A. Aleksin, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] A strong deep earthquake occurred in the neighborhood of Kamchatka Bay on 17 August 1983 (coordinates 55.64N, 161.52E, depth 98 km, magnitudes m_{pv} = 6.5, M_{LH} = 6.8). The epicenter was on land; ground oscillations were registered at two seismic stations; the epicentral distances for these stations were 102 and 117 km respectively. A study was made of the frequency composition of the oscillations (accelerations and velocities) on the basis of available records of strong movements. There was a considerable difference in the nature of the amplitude spectra for the two stations. There is a predominance of high-frequency harmonics in the frequency range of P-waves. S-waves have a broader spectrum in which the differences between the high and low frequencies are not so conspicuous. In the horizontal components of oscillations S-waves play the predominant role and determine the intensity of oscillations in the entire frequency range. The seismic records for the Kamchatka event contained information on a Gazli earthquake which was used in illustrating the frequency composition of oscillations from foci with an approximately equal magnitude but with different depth and intensity. Figures 5; references 5: 4 Russian, 1 Western.

5303/12955
CSO: 1865/105

UDC 550.34.06

VOLCANIC TREMOR OF KLYUCHEVSKIY VOLCANO (ERUPTION OF SUMMIT CRATER IN 1984)

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 86
(manuscript received 2 Sep 85) pp 39-53

[Article by Ye. I. Gordeyev, Yu. Yu. Melnikov, V. I. Sinitsyn and V. N. Chebrov, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] An eruption of the summit crater of Klyuchevskiy volcano on Kamchatka began in March 1984. This event was convenient for carrying out seismological research for studying volcanic tremors. The great duration of the eruption and the intensity of the eruption made it possible to organize observation systems both in the near zone and at a considerable distance. Field observations were made in July-August 1984 near the volcano to study the spectral and wave composition and the spatial and temporal variations

of volcanic tremor spectra, to ascertain the location of the source of volcanic tremors and to determine the phase velocities and parameters of attenuation of seismic waves of volcanic tremors. Observations were made using five ASS three-component autonomous seismic stations. Observations were made at distances 12-36 km from the source and all wave field parameters were therefore distorted by the intervening medium. It was clarified that the tremors consist of surface waves and that the source is situated in the neighborhood of the active crater. A multilayer nature of the medium is indicated by the large number of stable spectral maxima at each observation point. At virtually all observation points the upper horizons consist of interbedded deposits of volcanic origin consisting of pyroclastics and lava flows. The complexity of the waves and the spatial instability of the wave fields of tremors are attributable to the existence of considerable saptial inhomogeneities in the upper volcanic-sedimentary deposits of the volcanic structure. Volcanic tremors can serve as one of the most reliable quantitative factors characterizing the energy regime of an eruption. Figures 7; references 11: 8 Russian, 3 Western.

5303/12955
CSO: 1865/105

UDC 550.4:552.47:522.323.6

URANIUM DISTRIBUTION IN KIMBERLITES

Moscow EKSPRESS-INFORMATSIYA: RASPREDELENIYE URANA V KIMBERLITAKH in Russian No 8, 1986 pp 1-8

[Article by Ye. V. Pryakhina, M. Yu. Gurvich and L. D. Golovatenko, Moscow Geological Prospecting Institute]

[Abstract] The f-radiography method was used in studying kimberlites. This made it possible to estimate the uranium content in different kimberlite components and to define more complete series of rock-forming, accessory and secondary minerals on the basis of the regular change in uranium content and relationship to magmatic and postmagmatic processes. Data on the content and distribution of uranium in the main components of kimberlites indicated that there are two distinct varieties of kimberlites: those containing diamonds (low uranium content in the kimberlite matrix and high uranium content in olivine pseudomorphs and xeonliths) and those not containing daimonds (low uranium content in serpentine pseudomorphs and xenoliths and high uranium content in a matrix of serpentine-carbon-aceous composition). There are two stages of uranium accumulation in kimberlites (uranium is present in rock-forming and accessory minerals, later introduction of uranium associated with autometamorphism of kimberlites). Significant uranium concentrations in kimberlites are associated with country rock xenoliths and autoliths. Autolithic breccias appear to be one of the main types of kimberlites in the central fields of the Siberian Province. The partial xenogenic nature of uranium is also confirmed. The difference in mean uranium contents in productive and nonproductive kimberlites is evidently attributable to

their primary magmatic situation and is governed by the nature of the crystallization process.

5303/12955
CSO: 1865/101

UDC 553.98:550.361(571.1)

DETERMINING DEEP HEAT FLOW UNDER COMPLEX GEOTHERMAL CONDITIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian
No 11, Nov 86 (manuscript received 12 May 85) pp 121-127

[Article by A. R. Kurchikov and B. P. Stavitskiy, West Siberian Geological Sciences Scientific Research Institute, Tyumen]

[Abstract] Heat flow density is computed most commonly using the formula $q = \lambda \Gamma$ (Γ is the geothermal gradient, λ is the thermal conductivity of rocks). This is suitable for many regions, but not for those with complex geothermal conditions. This is illustrated by data from deep boreholes in Western Siberia, where data obtained by different authors differ by more than 20% (not attributable to technical factors, but to such factors as the choice of reference horizons). Use of the formula $q = \lambda \Gamma$ without an analysis of the specific geological-geothermal situation can result in erroneous ideas concerning the heat field. It was found that there are many reasons why it was essential to develop a new approach to determining deep heat flow in those regions where complex conditions prevail. The basic solution for this problem was given by N. I. Nesterov, in colloboration with the authors of this article, in "Method for Quantitative Estimation of Heat Flow Using Mass Thermometric Data" (DOKLADY AN SSSR, Vol 259, No 5, pp 1179-1182, 1981). A more general approach is now proposed which makes it possible to calculate q in virtually all cases. The basis of the mathematical model for determining heat flow is the difference between the concepts of normal and natural geotemperature fields. Formulas are derived which give highly accurate results (error not in excess of 11%) even in regions with a very complex paleoclimatic history, such as Western Siberia. On the other hand, it has its limitations. For example, in the studied area it is necessary to have a definite number of experimentally determined values of the thermal conductivity coefficient for the main types of rocks making up the section in order to clarify the nature of the change in thermal conductivity with depth (the use of reference data can result in errors exceeding 10-15%). This and other difficulties are readily overcome and the quite simple method proposed can be used effectively in determining the distribution of deep heat flows. References: 11 Russian.

5303/12955
CSO: 1865/123

PROBLEMS IN ORE FORMATION AND CONSTRUCTING GENETIC MODELS OF ORE FORMATIONS (SECOND ALL-UNION CONFERENCE ON "GENETIC MODELS OF ENDOGENOUS ORE FORMATIONS")

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 9, Sep 86 pp 140-142

[Article by A. P. Berzina and A. A. Obolenskiy]

[Abstract] The Second All-Union Conference on "Genetic Models of Endogenous Ore Formations" was held at Novosibirsk during the period 27-29 November 1985. The conference was attended by about 250 persons from 64 organizations in 34 cities throughout the country. The participants heard the results of such research and examined the most efficient ways to solve the problems involved. The development of such models of endogenous ore formations has been in conformity to a decree of the USSR State Committee on Science and Technology, which recommended it as a primary task for the 12th Five-Year Plan for a number of organizations such as the Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, Experimental Mineralogical Institute, Geochemistry and Analytical Chemistry Institute, Geology and Geophysics Institute, many of whose specialists presented reports at the conference. It is believed that further development of the theory of endogenous ore formation and solution of practical problems in metallogenetic analysis and prediction of ore deposits are dependent on the availability of such genetic models. [Some of the reports are mentioned, but in general, by title and author only.] It became clear that such models make it possible to bring together the knowledge of geologists and specialists in related disciplines. The advantage of such models is that they afford the possibility for local prediction of hidden mineralization, evaluation of deep horizons and detection of deposits even when there is but a limited volume of information in the early stages of research. They also reveal the general patterns of occurrence of series of related ore formation as a genetic set of dynamic ore-forming systems. The following work has been done since the first conference: special models of individual ore formations have been constructed; a considerable volume of isotopic, experimental and thermobarogeochemical data has been collected which has made possible a quantitative description of elements of the dynamics of ore-forming processes for most of the most important ore formations. The conferees suggested that interdepartmental working groups be established in order to ensure more vigorous pursuit of these objectives.

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UDC 550.832.53:553.641

NUCLEAR GEOPHYSICS RESEARCH IN BOREHOLES IN SELIGDARSKOYE APATITE DEPOSIT

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 9, Sep 86
(manuscript received 21 Jan 85) pp 115-122

[Article by A. P. Taushkanov, B. S. Kamyshev, O. V. Shishakin, A. P. Burmenskiy and V. A. Makeyev, "Rudgeofizika" Scientific Production Association, Alma-Ata]

[Abstract] The ores in the Seligdarskoye deposit are dolomitic marbles, everywhere having different degrees of mineralization (average content 6-7% P_2O_5). The country rock is crystalline schists and gneisses of Archean age, also containing up to 0.5-1.0% P_2O_5. The mineral composition of the ores is quite complex, consisting primarily of dolomite, calcite and apatite (total content about 85%). The ores can be divided into three classes on the basis of P_2O_5 content: poor (up to 3%), average (3-6%) and rich (over 6%). When making determinations by nuclear geophysics methods the most accessible ore elements are fluorine, thorium and cerium. Particularly recommended for such work are the neutron activation logging method for fluorine (NAL-F) and spectrometric gamma logging for thorium (SGL-Th). The results of NAL-F work for determining the depth and thickness of ore bodies and the concentration of P_2O_5 in them were highly reliable for ores with a concentration of more than 3% P_2O_5 (equal in accuracy to the core sampling method). The results of SGL-Th work in determining P_2O_5 concentrations are less accurate than the results obtained by the NAL-F method and are frequently ambiguous even despite excellent discrimination of zones of apatite mineralization. Accordingly, in the study of apatite deposits of the Seligdarskoye type it is recommended that the NAL-F method be employed as one of the principal methods for borehole investigations in all stages of geological prospecting work. Figures 2; references: 7 Russian.

5303/12955
CSO: 1865/128

UDC 551.7.02:551.71/72(574.3)

PRECAMBRIAN CORRELATION IN CENTRAL KAZAKHSTAN

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 4, GEOLOGIYA in Russian No 5, Sep-Oct 86 (manuscript received 27 Dec 85) pp 52-67

[Article by L. I. Filatova, Moscow University]

[Abstract] The officially adopted correlation diagram for the Precambrian in Kazakhstan and the Tien Shan dates back to 1971-1972. During the time which has elapsed much additional work has been done which has now made it possible to draw up a revised diagram, which is presented in this article. The article essentially gives a critical review of the literature which

has been published since the adoption of the official version over 15 years ago. The great importance of the so-called Ulutau profile is stressed; it serves as a sort of "backbone" for the stratigraphic work done in Central Kazakhstan. The objective of work in recent years has been removal of certain uncertainties in validity of the adopted diagram, with emphasis on determination of the pre-Riphean component. Particular attention is given to the author's own work in which she made use of lithological, geochemical and petrographic methods and employed the uranium-thorium-lead method in a radiochronological study of Precambrian reference levels. The validity of the official diagram is essentially unchallenged, except in detail, but it is clear that pre-Riphean strata are much more important than had been assumed previously. Research, however, must be continued. It is recommended that greater use be made of the uranium-thorium-lead method, and locally, more emphasis should be placed on the paleontological method. References: 33 Russian.

5303/12955
CSO: 1856/117

UDC [549.283:541.18]+549.271.1[553.411'43.068.5:551.763](575.192)

COLLOFORM-FRAMBOIDAL-NODULAR FORMS OF PALLADIUM-BEARING GOLD IN SOUTHWESTERN SPURS OF GISSARSKIY RANGE

Tashkent UZBEKSKIY GEOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 86 (manuscript received 12 Dec 85) pp 59-63

[Article by Z. S. Zhuravleva, Chemical Geology of Nonore Minerals Administration, Geology Ministry, Uzbek SSR]

[Abstract] In 1985 a colloform-framboidal-nodular form of gold was discovered in the southwestern spurs of the Gissarskiy Range, primarily in Quaternary deposits in an area of development of Mesozoic, predominantly Cretaceous deposits. There is every indication that this is gold which was washed from Cretaceous rocks in the process of downcutting of modern channels. A complete mineralogical analysis was made of these finds. A biochemogenic-chemogenic-sedimentation nature of this gold accumulation was deduced form this analysis, as well as from its association with the pelitic component, organic carbon, calcareousness of the sediments, association of maximum contents near the boundaries of formations, absence of secondary geochemical aureoles, dislocations and secondary modifications of endogenous origin. Organic matter has favored the formation of carbon, phosphorus, sulfur, iron and other elements and formation of a zone of hydrogen sulfide pollution. The sources of this gold may have been, in addition to quartz-gold ore veins, the ancient weathered crusts and zones of oxidation of pyrite-polymetallic ores of the region. The gold emanating from these formations is fine and brittle. The palladium present may also have originated from the ancient weathered crust and oxidation zones. Information has therefore been collected on a new type of deposits in the sandy-clayey Mesozoic-Cenozoic deposits which occur extensively in Southern Uzbekistan. Figures 1; references: 6 Russian.

5303/12955
CSO: 1865/111

UDC 528.1:[2021:553.061.2(575.1)]

MAPPING OF BURIED BUKANTAU MAGMATIC FORMATIONS BY REMOTE METHODS (CENTRAL KYZYL KUM)

Tashkent UZBEKSKIY GEOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 86 (manuscript received 26 Mar 86) pp 6-8

[Article by A. B. Kirillov, Geology and Geophysics Institute imeni Kh. M. Abdullayev, Uzbek Academy of Sciences]

[Abstract] Remote methods have been used in mapping buried intrusive formations in the Bukantau Mountains. In particular, interpretation of television images from the "Meteor-30" in the near-IR spectral zone (0.7-1.1 μm) at 1:2,500,000 revealed intrusive bodies most of which do not emerge at the surface. The interpretation criteria used were phototone, isometric configuration, notching along the perimeter and photoimage pattern. On the photographs the intrusive bodies have a lighter phototone than the Riphean-Paleozoic sedimentary-metamorphic formations surrounding them. A total of 23 intrusive bodies were detected using these criteria. These magmatic bodies, which do not emerge at the surface, could be detected due to the "translucence" effect. It was found that the bodies detected from the television images can be discriminated on space photographs using geomorphological criteria, such as relief and nature of distribution of eolian sands. Thus, on the television images the magmatic bodies are detected using direct interpretation data, while on space photographs they are determined using indirect criteria. The detection of buried intrusions is extremely difficult on high-resolution photographs. With a low resolution and a high degree of generalization of the television image the details merge and give rise to photoanomalies. The finding of these "translucent" magmatic bodies can be used in compiling maps of the basement of sediment-covered areas and in predicting contact and other types of mineralization. Figures 2; references: 3 Russian.

5303/12955
CSO: 1865/111

UDC 548/549:550.42:553.3/9

MINERALOGICAL-GEOCHEMICAL CHARACTERISTICS OF QUARTZ-SULFIDE-GOLD ORE FORMATION IN TUYAMO-BURATINSKIYE MOUNTAINS

Tashkent UZBEKSKIY GEOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 86 (manuscript received 15 Dec 85) pp 3-6

[Article by Kh. N. Raymukhamedov and A. A. Abdurakhmanov, Earth Sciences Department, Tashkent Order of Friendship of Peoples Polytechnic Institute imeni Abu Raykhana Beruni]

[Abstract] Gold mineralization in Uzbekistan is manifested in a variety of forms. A special study was made of the mineralogical and geochemical characteristics of the quartz-sulfide-gold ore formations in the Tuyamo-Buratinskiye Mountains. The mineralized area is represented by sandy-schistose Cambrian and Ordovician deposits. The intrusive formations are dikes of quartz porphyries and quartz diorites. The area is on the southern side of the Karatau anticline which is complicated by folding and faulting. The gold mineralization area is characterized by three lithological-structural zones: northern (quartzy-schistose breccias and veins of quartz with sulfides), central (brecciated schists with sulfides), southern (quartz sulfide veins). Several significant associations were defined (each is described in detail): quartz-pyrite-gold ore, quartz-pyrite-arsenopyrite-gold ore, quartz-pyrite-arsenopyrite-galenite-sphalerite-gold ore and quartz-calcareous. There was a multistage nature of formation of this mineralization with most of the gold being associated with the quartz-pyrite-gold ore and quartz-pyrite-arsenopyrite-galenite-sphalerite-gold ore associations and there is a definite correlation between gold and arsenic. A distinguishing feature of these mineral associations is a low sulfide content, this being more characteristic of the quartz-pyrite-gold ore association than of the quartz-pyrite-arsenopyrite-galenite-sphalerite-gold ore association. References: 4 Russian.

5303/12959
CSO: 1865/111

BRANCH SCHOOL ON INTRODUCTION OF GEOCHEMICAL METHODS FOR RECONNAISSANCE AND EXPLORATION OF PETROLEUM AND GAS DEPOSITS

Moscow GEOLOGIYA NEFTI I GAZA in Russian No 10, Oct 86 pp 62-63

[Article by A. V. Petukhov and N. S. Kukuyeva, All-Union Nuclear Geophysics and Geochemistry Scientific Research Institute]

[Abstract] A branch conference on experience gained from the introduction of geochemical methods for reconnaissance and exploration of petroleum and gas deposits in Turkmenia was held at Ashkhabad in September 1985. It was attended by more than 60 specialists from various parts of the USSR.

Specialists discussed the fundamental principles of the theory of geochemical methods, means for application of these methods and methods for processing geochemical information in predicting the presence of petroleum and gas and local geological structures at different stages in geological prospecting work for petroleum and gas. Work has begun on metrological support and instrument making for field research. Specific reports dealt with such subjects as the results of physicochemical modeling of the processes of formation of geochemical fields over hydrocarbon deposits, the principles and results of combining geophysical, geochemical and aerospace methods and the optimization and standardization of geochemical research in the search for and exploration of petroleum and gas deposits. It was also noted, however, that there are serious shortcomings in the organization of work, development and introduction of geochemical methods. In the USSR there is no far-flung network of expeditions and parties conducting geochemical search for petroleum and gas. There is a poor scientific foundation for the geochemical methods used in search for and prediction of petroleum and gas deposits for various geological-geochemical and landscape-geochemical conditions. There are no specialized design bureaus or manufacturing plants for the production of field geochemical equipment. Antiquated and imperfect equipment is in use, resulting in inefficient work and the discrediting of geochemical methods. Too little is being done in the field of metrological support. The next such conference is to be held in 1987.

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CSO: 1865/124

UDC 550.348.422

CORRELATION BETWEEN SEISMIC ACTIVITY AND VARIATIONS OF MICROSEISMIC OSCILLATIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian, No 10, Oct 86 (manuscript received 12 Dec 84) pp 99-106

[Article by Ya. S. Sharipov, Earth Physics Institute, USSR Academy of Sciences]

[Abstract] There is a definite correlation between the level of short-period microseisms and seismic activity. A negative correlation exists between the diurnal changes in the level of microseisms and the number of regional earthquakes. The mean daily fluctuations of levels of microseisms exhibit a positive correlation. The mean daily level exhibits no significant correlation with seismic activity, which may be a result of predominance of industrial noise in the course of a large part of the day. The mean daily variations in the nighttime level of microseisms (measured with a 1-hour interval) are correlated with the mean variations of seismic activity over the course of 24 hours. The correlation measured for nighttime is 0.43, whereas for the daytime the correlation level drops to -0.25. These results in general are consistent with research data indicating a correlation between seismic activity and the level of high-frequency noise and storm-

generated microseisms, as well as with the increase in the level of high-frequency microseisms several hours prior to strong earthquakes. Figures 7; references 17: 15 Russian, 2 Western.

5303/12955
CSO: 1865/126

UDC 550.34.038

DETERMINING TRAJECTORY OF GROUND MOVEMENT ACCOMPANYING SEISMIC PHENOMENA

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 10, Oct 86 (manuscript received 24 Oct 85) pp 14-19

[Article by V. M. Grayzer, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences]

[Abstract] There is a need for a new approach to the design of seismometric measurement systems for registering the trajectory of ground movement. Possible ways to solve this problem are examined: retrieval of true displacements from records of existing pendulum instruments; development of fundamentally new measurement systems; use in seismology of registry principles successfully employed in other branches of science and technology. Since it was necessary to register the trajectory of ground movement or true movement in the range of frequencies from zero to some fixed frequency (20-50 Hz), two schemes were proposed for constructing measurement systems on the basis of six-pendulum accelerographs which make possible separate determination of translational and rotational movement of the soil, excluding the influence of the transverse component of oscillations. These methods are similar to those developed for inertial navigation. It would be possible to employ three accelerometers oriented in three mutually perpendicular directions, mounted on a platform and spatially stabilized using gyroscopic instruments. Without changing its orientation at the earth's surface, the platform precludes the influence of rotations of the instrument base and makes it possible to register purely translational accelerations. Integration of accelerometer readings, assuming a high resolution, makes it possible to determine the rate and displacement of the instrument base. Another possible variant provides for use of three accelerometers and three gyrotachometers for measuring angular accelerations, with accelerations and rotations being registered independently. The latter variant is preferable since it is easier to construct. Figures 2; references: 9 Russian.

5303/12955
CSO: 1865/126

UDC 911.2(100.4):528.71

ACADEMIC COURSE 'SPACE METHODS FOR STUDYING MODERN LANDSCAPES OF CONTINENTS'

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 5, GEOGRAFIYA in Russian No 6, Nov-Dec 86 (manuscript received 15 Jul 85) pp 78-82

[Article by Ye. V. Glushko, Moscow University]

[Abstract] A course for the development of professional skills in the use of space photographs for research in the field of physical geography was introduced in the Department of Physical Geography of Foreign Countries of Moscow University in 1974. Space photographs are the only source of information for studying many regions of the earth. In this course the emphasis is on the study of present-day landscapes incorporating both natural and anthropogenic components. The course involves both lectures and practical exercises. Included in the subject matter are the following. Theoretical principles of space methods for landscape research, including optical properties of landscapes, and the system for the classification of modern landscapes. Study of the structure of modern landscapes by means of interpretations of space photographs and subsequent mapping. Natural and anthropogenic landscape components and principal types of environmental pollution identifiable on space photographs. Study of present-day analogue landscapes. Study of natural and anthropogenic processes, as well as rhythmic, dynamic and evolutionary changes of landscapes from space photographs. All lectures are accompanied by corresponding practical work with space photographs. All parts of the course correspond to a system of classifications of objects and their interpretation criteria developed by the department [this classification is summarized in a table]. In their practical work students use space photographs in the interpretation of Quaternary deposits, relief, hydrographic network, soils, vegetation and land use. Effective teaching of the course assumes a knowledge of the geography of foreign countries acquired in earlier courses. Extensive use is made of space photographs during summer field work. References: 10 Russian.

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CSO: 1865/122

UDC 551.21(100)+551.509(4/5)

GREATEST VOLCANIC ERUPTIONS IN WORLD DURING 17th-18th CENTURIES AND WEATHER ANOMALIES IN EURASIAN MIDDLE LATITUDES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 5, GEOGRAFIYA in Russian No 6, Nov-Dec 86 (manuscript received 29 Jan 86) pp 64-71

[Article by S. I. Varushchenko, Moscow University]

[Abstract] A global intensification of volcanic activity occurred in the spring of 1982, resulting in a marked increase in atmospheric pollution.

[illegible] to the question of how this would affect weather in the [illegible]. A physical-mathematical model can be used in making such a [illegible], but data for the model are limited to the period of instrumental [illegible]. In order to broaden the base for such a model the author [illegible] various materials for the 17th-18th centuries based on paleogeo-[illegible], glaciological and historical sources, thereby lengthening by two cen-[illegible] the series of observations indicative of the dependence of climate on volcanic activity. A map was plotted showing all volcanic eruptions during these two centuries which ejected large quantities of aerosol. The [illegible] were broken down into five time intervals: 1600-1605, 1640-1645, [illegible], 1728-1732 and 1782-1786, with each such interval being broken down into three periods: 1) time between the eruption and the onset of [illegible] of acid rain, 2) the year or two when there was heavy falling of [illegible] precipitation in Greenland and 3) subsequent 2-year period characterized by a relatively small quantity of aerosols in the atmosphere. The grouping of years by these periods made it possible to assess how weather conditions in a number of regions in Eurasia reacted to different atmospheric contents of volcanic aerosols. The effects were analyzed for three regions: [illegible], Russian plain and Japan. In the Alps, for example, the most clearly expressed glacial maxima were in 1601 and in 1643-1644, years which were simultaneously cold and moist, following powerful volcanic events of [illegible] and 1640-1641. Similar correlations (and noncorrelations) were examined for the Russian plain and Japan. In general, a demonstrable correlation exists between volcanic eruptions and subsequent weather conditions. Par-[illegible] predominant among such weather phenomena were very cold and very [illegible] summers. The anomalies in most cases were expressed about 1.5 years following the eruptions. The exclusive role of volcanic events in subsequent [illegible] is not claimed, but this is a factor which must be taken into account in forecasts in the 1-3 years which follow. Figures 3; references 9: [illegible].

[illegible]
[illegible]

UDC 528.7

[illegible] PRINCIPLES FOR COMBINING REMOTE SOUNDING AND THREE-[illegible]

[illegible] MOSKOVSKOGO UNIVERSITETA: SERIYA 5, GEOGRAFIYA in Russian [illegible] (manuscript received 8 Feb 86) pp 56-64

[illegible] D. D. Musin, B. A. Novakovskiy and S. N. Serbenyuk, Moscow [illegible]

[illegible] The article describes work done at Moscow University on some [illegible] of automated three-dimensional mapping of the relief image of the [illegible]'s surface on the basis of photogrammetric digital terrain models. [illegible] is given to the role of photogrammetry in the further introduction of [illegible] sounding in cartographic work and geographical research. The

possibilities afforded by the combining of remote sounding and three-dimensional mapping are illustrated in the example of cartometric interpretation of a fragment of a digital terrain model using the "AKS-MGU" automated cartographic system developed at Moscow University. The importance of this work for the user is that he is supplied with a definite set of mutually supplementing metric and nonmetric components of three-dimensional mapping which may or may not be matched with the initial photographic image. The photogrammetric methods make it possible to introduce remote sounding into geographical research by a quantitative interpretation of aerial and space photographs. This is an effective means for forming a digital data base which can be used in obtaining a wide range of cartometric and morphometric indices, which are key elements for three-dimensional mapping. Figures 3; references 10: 9 Russian, 1 Western.

5303/12955
CSO: 1865/122

UDC 622.34.342:553.048

ALLOWANCE FOR VARIABILITY OF MINERALIZATION PARAMETERS OF GOLD-BEARNING VEINS FOR OPTIMIZATION OF THEIR WORKING LIMITS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 5, Sep-Oct 86 pp 79-87

[Article by S. M. Rakhimbekov, Mining Institute, Kazakh Academy of Sciences, Alma-Ata]

[Abstract] The problems involved in detecting and analyzing the variability of the key parameters of mineralization of gold-bearing veins were studied (the most important factor in such an evaluation, of course, is the geological structure of the studied area). A preliminary evaluation is essential in order to have a proper assessment of the conditions for and limits of extraction of ore, make a correct choice of means for working the veins and designs of extraction equipment. Such determinations are also necessary for reckoning the norms for quantitative and qualitative losses of mineral and for drawing up production plans. Minimum limits of ore concentration must be established in order to ascertain what parts of the deposit are exploitable from technical and economic points of view. It is shown that these problems can be solved by formulating a model which makes it possible graphically, compactly and automatically to comprehend the influence of various types of working conditions, to evaluate different pertinent indices and to ascertain the spatial position of ore deposits. The harmonic nature of changes in the mineral deposit makes possible their spatial prediction. An algorithm and set of programs were prepared for use in such work. A block diagram is given which illustrates the desirable methodological approach. The approach was tested in the field and proved to be highly effective, resulting in substantial savings of time and money. Figures 4; references: 3 Russian.

5303/12955
CSO: 1865/119

UDC 550.42:552.48(574.2)1.2.

RADIOGEOCHEMICAL AND PETROCHEMICAL CHARACTERISTICS OF ECLOGITES AND ECLOGITELIKE ROCKS IN NORTHERN KAZAKHSTAN

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 5, Sep-Oct 86 pp 52-57

[Article by L. A. Trofimova, A. G. Burdynyuk and N. G. Syromyatnikov, Geological Sciences Institute imeni K. I. Satpayev, Kazakh Academy of Sciences, Alma-Ata]

[Abstract] In order to clarify the nature of the eclogites and eclogitelike rocks in Northern Kazakhstan use has been made of the indicator properties of uranium and thorium, as well as the fission radiography method. These make it possible to determine the spatial distribution of uranium and to estimate its content in rocks. Determination of uranium distribution and its content in the very same minerals, but of different origin, makes it possible to define exploration criteria for different types of mineralization. The behavior of these radioactive elements was studied by taking samples from the three main groups of melanocratic metamorphic rocks of Northern Kazakhstan containing garnet and pyroxene: gabbro-drusites, eclogites and Mg-Fe-Ca metasomatites. Uranium and thorium in the samples were determined by the neutron activation, x-ray spectral analysis and alpha track methods. The uranium and thorium content and Th/U ratio was determined for gabbro-diabases, gabbro-drusites, apogabbroic amphibolite, eclogites, amphibolized eclogites, marble and Mg-Fe-Ca metasomatites. It was determined that U and Th can serve as indicators in separating eclogites and eclogitelike rocks which are close in composition but different in origin. Using data on the characteristics of U and Th distribution and the chemical properties of these elements it is possible to judge some properties of the medium in which these rocks were formed. Eclogitelike rocks which contain useful components are characterized by high Th/U ratios. Radioactive elements can therefore be used as an exploration criterion. Figures 1; references: 12 Russian.

5303/12955
CSO: 1865/119

UDC 551.24.035:551.73(-925.22)

CLAYEY DIAPIRISM AND FORMATION OF PALEOZOIC STRUCTURES ON SOUTHEASTERN MARGIN OF CASPIAN DEPRESSION

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 5, Sep-Oct 86 pp 21-25

[Article by Yu. A. Volozh, V. M. Pilifosov, V. P. Nikolenko and M. M. Tleppayev, Geological Sciences Institute imeni K. I. Satpayev, Kazakh Academy of Sciences; Kazgeofizika Geological Production Association, Alma-Ata]

[Abstract] A number of rather large archlike uplifts have been detected in the southeastern part of the Caspian depression by seismic prospecting methods. These uplifts are associated with Paleozoic subsalt deposits. These uplifts are grouped in several lines parallel to the edge of the basin. Exploratory drilling has been carried out on some of these uplifts and petroleum deposits have been detected. Most of the petroleum is associated with a terrigenous-calcareous layer of Middle Carboniferous deposits with a thickness of 100-400 m. It is felt that a proper evaluation of the prospects for finding petroleum in the subsalt formations in general and the choice of the direction for further petroleum prospecting work are dependent on solution of the problem of genesis of the Paleozoic uplifts. The determined structure of these deposits and the wave field characteristics have made it possible to construct a general tectonic model of formation of these archlike uplifts. Particular attention was given to seismostratigraphic research in the Ravninnaya structure where six seismic formations were discriminated in the section of subsalt deposits. The role of clayey diapirism was carefully studied. The model suggests that work should be concentrated on exploration and mapping of limestones (conglomerates) which may contain considerable reserves of hydrocarbons. These deposits have a limited extent and occur only at a definite distance from the edge of the depression. At greater distances from the margin such limestones were not accumulated due to the great depth of the basin. Figures 1.

5303/12955
CSO: 1865/119

UDC 553.98(-925.222)

TEMIR CALCAREOUS COMPLEX: FOREMOST STRUCTURE IN SEARCH FOR PETROLEUM AND GAS IN CASPIAN DEPRESSION IN TWELFTH FIVE-YEAR PLAN

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 5, Sep-Oct 86 pp 12-21

[Article by T. A. Akishev, Yu. A. Volozh, Ye. S. Gushchin, O. A. Zhuykov, S. K. Kurmanov, B. A. Ogay, V. M. Pilifosov and R. B. Sapozhnikov, Geological Sciences Institute imeni K. I. Satpayev, Kazakh Academy of Sciences; Kazgeofizika Geological Production Association, Alma-Ata]

[Abstract] During the current five-year plan an effort is being made to increase greatly the volume of geological prospecting work in the Caspian depression. Experience from the preceding two five-year plans indicates that it would be best to search for large calcareous complexes. Seismo-stratigraphic research over a period of three years revealed the presence of such a complex along the eastern margin of the Caspian depression in the neighborhood of the Temir arch. The Temir arch is a major positive structure at the northern end of the Aktyubinsk-Astrakhan zone of basement uplifts. The arch has an amplitude of 1.5-2 km, measures 200 x 50 km and is complicated by a number of second-order uplifts. Figure 1 is a structural map of the Temir complex. An exploratory network of seismic profiles, supplemented by drilling, has yeilded much new information concerning the geological structure of this zone. This information and earlier data have made it possible to construct a new model of the Temir zone which has resulted in a higher estimate of its potential content of petroleum and gas. Important information has also been obtained on the genesis of the arch: it can be regarded as a Paleozoic atoll. The probability of discovery of major deposits of hydrocarbons is very high (the complex is genetically identical to the Astrakhan and Tengiz atolls, with which significant petroleum and gas deposits are associated). Figures 4.

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PROSPECTS IN SEARCH FOR SUBSALT (INTERSALT) PALEOZOIC PETROLEUM AND GAS IN INNER MARGINAL REGIONS OF CASPIAN DEPRESSION

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA GEOLOGICHESKAYA in Russian No 5, Sep-Oct 86 pp 3-5

[Article by M. A. Aytkhozhin, Geological Sciences Institute imeni K. I. Satpayev, Kazakh Academy of Sciences, Alma-Ata]

[Abstract] The discovery of the Astrakhan, Karachaganak, Tengiz and Zhanazhol gas condensate and petroleum deposits is transforming the Caspian

basin into a petroleum- and gas-producing base of the country. However, there are considerable difficulties in the search for subsalt structures. The discrimination of major pre-Kungurian uplifts and clarification of their genesis is highly important in the search for petroleum and gas in its inner marginal regions. These regions have been explored using a large number of independent geological and geophysical methods (large-scale geological survey, geomorphology, geochemistry, comparative analysis of tectonics and presence of petroleum and gas in Caspian and Dnepr-Donets basins, gravimetry, electrical prospecting). Taking into account the newness of the explored areas and their great extent (area up to 1,500-2,000 km^2), in order to proceed from regional geological-geophysical work to work on the reconnaissance scale it is recommended that individual parametric holes be drilled to depths of 6,000-7,000 m in the arches of pre-Kungurian uplifts. This will make it possible to define the zones of petroleum and gas accumulation more precisely. References: 4 Russian.

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LASER SYSTEM FOR AUTOMATING TOPOGRAPHIC TERRAIN SURVEY

Moscow GEODEZIYA I KARTOGRAFIYA in Russian No 10, Oct 86 pp 38-41

[Article by V. S. Golov, Yu. M. Desyatykh, A. S. Fedorov and A. G. Paramonov]

[Abstract] An experimental model of a system based on a helium-neon laser was developed for the purpose of finding ways to automate a topographic survey. The system consists of a transmitter mounted over a point with known coordinates (theodolite traverse station) and a receiver which during the course of the survey is moved along the line. The transmitter includes a laser transmitter with a rotating head and a radio transmitter. The laser transmitter shapes two beams, one of which is horizontal, whereas the other slants at the angle β to the horizon. The lower beam during rotation of the head creates a horizontal plane, whereas the upper beam creates a conical surface. In the form of pulses the radio transmitter transmits information on the angle of rotation of the rotating head relative to the initial direction. The initial direction is the direction to the second theodolite station, at which the receiver is placed prior to onset of the survey. The receiver consists of a photodetector with a circular-scan objective which is attached on a telescopic rod which is used for moving it vertically. It has a "movement-code" converter and a computer with a digital display for indicating the three determined coordinates. In the base there is an electromechanical drive for raising and lowering the photodetector. The working principles and procedures are described. The rms error in measuring distances is 0.49 m, angle 2', relative elevation 2 cm. The maximum effective range is 300 m, the area surveyed from one station is 28 hectares, transmitter weight is 30 kg, receiver weight is 19 kg and the time required for measuring coordinates at a station in one set is 8 s. Power is supplied by 12-V storage batteries. Figures 4; references: 3 Russian.

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UDC 528.026.1.088

ALLOWANCE FOR INFLUENCE OF GRAVITY FIELD NONUNIFORMITY

Moscow GEODEZIYA I KARTOGRAFIYA in Russian No 10, Oct 86 pp 5-8

[Article by A. P. Tsysar]

[Abstract] Corrections for gravity field nonuniformity in pendulum determinations of gravity can attain values which cannot be neglected. The quartz-metal pendulums developed by the Central Scientific Research Institute of Geodesy, Aerial Mapping and Cartography (TsNIIGAiK), used in the "Agat" pendulum outfit, are widely employed in establishing higher-order gravimetric networks. With such a high measurement accuracy it is necessary to take into account gravity field nonuniformity at each point. The constants of the TsNIIGAiK quartz-metal pendulum have been determined and a formula has been derived for the total correction for gravity field nonuniformity measurements made with TsNIIGAiK pendulums. Nomograms were constructed on the basis of these formulas and are used in introducing corrections into pendulum measurements. A table was prepared giving the components of the correction ($\Delta_1 g$, $\Delta_2 g$ and $\Delta_3 g$) for some values of the derivatives of gravity potential from surrounding masses. Errors can be caused by building walls, the pedestal on which the instrument sits and other factors, and these must be taken into account since they increase the normal gravity gradient. After introducing these correction components for the nonuniform gravity field the gravity field at the measurement point is related to the instrument point coinciding with the middle of the pendulum knife blade. Figures 1; references: 3 Russian.

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UDC 551.241

STUDY OF ASTHENOSPHERE. PROJECT ELAS.

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 9, Sep 86, pp 54-61

[Article by L. L. Vanyan, doctor of technical sciences and V. V. Gondiyenko, doctor of geological mineralogical sciences]

[Abstract] Under the auspices of the USSR Academy of Sciences, geophysicists from 19 countries have united their efforts to study the asthenosphere under project ELAS [Electroconductivity of the Asthenosphere]. Studies on project ELAS have been supplemented by seismic and geothermal studies. This article discusses the scientific basis of the project. The joint use of electromagnetic and geothermal data can be quite productive in the study of partial melting in the asthenosphere. The top of the zone of partial melting is observed in geothermal studies as the depth of the solidus. The conductivity of this zone is most reliably determined by electromagnetic methods. It reflects the full content of the basalt melt in the asthenosphere. Partial melting is observed beneath the Pacific Ocean and the Far Eastern transition zone, but not beneath the Precambrian plates of the continents. In the first stage of Project ELAS, 1978-1985, primary attention has been given to deep electroconductivity. Significant lateral heterogeneity in the asthenosphere has been found: partial melting developed beneath the oceans (except for the most ancient regions), but not beneath the Precambrian plates. The second stage in the project will involve joint study of the asthenosphere by various geophysical methods. Figure 1.

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UDC 551.515

ELECTROMAGNETIC RADIATION WITH CENTRAL FREQUENCY 2 Hz DURING GREAT CYCLONE OF 9 JUNE 1984

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 3, Sep 86 (manuscript received 2 Jul 86) pp 582-585

[Article by R. V. Shchepetnov, V. A. Troitskaya and B. V. Dovbnya, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences, Moscow; "Borok" Geophysical Observatory, Yaroslavl Oblast]

[Abstract] As a powerful cyclone passed over the European USSR on 9 June 1984, for the first time electromagnetic radiation was registered with a central frequency of about 2 Hz, proceeding, accompanying and following the passage of the cyclone. This effect was detected on highly sensitive records of the magnetic field at "Borok" Observatory. The cyclone had unusually low pressure at its center (below 980 gPa). The intensity of the radiation exceeded the dynamic range of the instruments used to record it at 1200-1400 UT, then continued to be recorded up to 2300 UT with gradually decreasing amplitude and ever-narrower frequency range. Analysis of a number of Antarctic cyclones has confirmed the presence of radiation with similar parameters accompanying. The cyclone of 8-9 June 1984 was thus a powerful source of acoustic and gravitational waves. Electromagnetic and hydromagnetic disturbances could have been generated by acoustic waves reaching the lower ionosphere. Figures 4; references: 6 Russian.

6508/12955
CSO: 1865/52

UDC 525.73

METHOD FOR DETERMINING ATMOSPHERIC TEMPERATURE PROFILES FROM OBSERVATIONS OF ASTRONOMICAL REFRACTION OF STARS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 (manuscript received 24 Sep 85) pp 1332-1335

[Article by N. A. Vasilenko, K. P. Gaykovich and M. I. Sumin, Main Astronomical Observatory, Ukrainian Academy of Sciences, Kiev; Gorkiy Radio Physics Scientific Research Institute]

[Abstract] Theoretical and experimental work was done to determine the possibilities of retrieving vertical temperature profiles from refraction measurements when observing celestial bodies from the surface at positive angles of elevation. This required derivation of a fundamental equation which relates refraction ξ and the atmospheric refractive index n, which is reduced to a Fredholm equation of the first kind by integration by parts. Two algorithms were written for solving the new equation involving use of the statistical regularization method or a compact class of monotonic

functions. Suggestions are made on overcoming a number of inherent difficulties in the problem. Effectiveness was checked by comparing retrieved profiles and aerological sounding data (in the example of combined astronomical and aerological observations in a semidesert region). Specific data from practical application of the method are cited. These examples indicate that the accuracy of measurements of refraction, the accuracy in computing the kernel of the pertinent integral equation and the degree of correspondence of the spherically symmetric approximation to the real atmosphere meet all requirements. Retrieval accuracy is equal to that obtained by surface microwave radiometry methods. Figures 3; references 4: 3 Russian, 1 Western.

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CSO: 1865/106

UDC 551.510.42

MESOSCALE AEROSOL CLOUDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 6, Oct 86 (manuscript received 29 Aug 85) pp 1328-1331

[Article by B. D. Belan and G. N. Zadde, Atmospheric Optics Institute, Siberian Department, USSR Academy of Sciences, Omsk]

[Abstract] The article describes an atmospheric phenomenon detected during aircraft sounding of the atmosphere in 1981 and 1983-1985 on expeditions of the Atmospheric Optics Institute, USSR Academy of Sciences. Regions with an increased (by approximately an order of magnitude) aerosol concentration with a horizontal scale 10-20 km were detected in the clear dry atmosphere at altitudes exceeding 1,000 m. Air temperature and humidity remain almost constant during these events and local aerosol sources are absent both in the atmosphere and at the earth's surface. Such regions were observed over Kazakhstan, Western and Eastern Siberia. The distinguishing characteristic of the appearance is a very low relative humidity U < 40%, regardless of air temperature (-20.6-+7.5°C). The altitude of formation varies in the range 1,200-4,930 m. The aerosol concentration in the clouds is usually greater by a factor of 4-10 than in the surrounding medium, sometimes greater. They are usually observed after 1400 hours. Such phenomena are observed in regions under the influence of an anticyclone or at the rear of a cold front where there are Cu hum clouds. The possibility of an anthropogenic origin of these clouds is precluded. The greatest number of clouds observed in the aerosol field is 11. Such an aerosol cloud has a vertical extent of 300-600 m with a horizontal extent 12 km. The clouds may be the dry remnant of a water cloud which evaporates after lessening of the convection feeding the cloud or may be an independent atmospheric formation arising for unknown reasons or there is a convective mechanism of formation of aerosol clouds. Figures 2.

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CSO: 1865/106

UDC 551.21+551.594

RESEARCH ON ELECTRIFICATION OF CLOUDS CAUSED BY PULVERIZATION OF VOLCANIC ASH

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 86 (manuscript received 5 Jun 85) pp 17-29

[Article by O. P. Bulenko, N. N. Klimin, I. N. Dyakonova and V. Yu. Kiryanov, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences; Main Geophysical Observatory]

[Abstract] Particles were pulverized in a large chamber in order to investigate the contact electrification phenomenon observed in ash clouds associated with volcanic eruptions. The simulation experiment was in a chamber with a volume 61 m^3 at the Main Geophysical Observatory. Four ash samples taken during eruptions of three volcanoes were used, divided into six fractions. The electrical properties of the clouds formed in the fog chamber were determined. A dipole electric structure was observed in the chamber clouds due to the charging of large and small particles with different signs and their spatial separation under the influence of gravity. The reason for such charging is the difference in the mineralogical composition of large and small particles (different content of crystals and glass). The rate of bipolar charging of the clouds is dependent on the mineralogical and disperse composition of the large and small particles and the relation of their size, number and weight. In the case of asymmetric charging of ash particles their size screening factor characterizes the rate of separation of volume charges in a cloud. With a decrease in the median diameter of the particles, with one and the same ash mass, the intensity of cloud electrification increases. There is a nearly linear dependence of the intensity of cloud electrification on the mass of pulverized ash. The greater the ash mass, the greater is the cloud electrification. Figures 8; references 10: 9 Russian, 1 Western.

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UDC 528.024.1.088.24

DETERMINING REFRACTION FROM IMAGE BLURRING OF PARALLEL WIRE

Moscow GEODEZIYA I KARTOGRAFIYA in Russian No 10, Oct 86 pp 11-14

[Article by V. V. Vinogradov, A. S. Medovikov and Ye. K. Nikolskiy]

[Abstract] In leveling work it is common to use a method for taking refraction into account which is based on its physical relationship to the amplitude of oscillation of a line image which is caused by the turbulent nature of the atmospheric surface layer. This method is correct, but the measurement process is complex and the evaluation of the amplitude of oscillations

is highly subjective. Accordingly, a solution of this problem is proposed which is based on the same physical premises but is easier to use. The turbulence of the medium in which a light ray propagates results in fluctuations of its parameters, especially the angles of arrival, which cause image oscillations of the target visible to the eye. As a result of fluctuation of the angles of arrival the contrast of the horizontal bands of the parallel mire will decrease as a function of the degree of turbulence. This degree of turbulence can be determined from mire contrast. In practical work it is feasible to use a mire with a variable period M equal to 0.3, 0.5, 0.7 and 1 mm, determining its value each time. At the time of making readings on the leveling rods the mire is used in determining the M value corresponding to a transition from contrasting to blurred bands. The article outlines the theoretical basis for the method. These theoretical principles were field tested in the summer of 1983 and later retested in a distinctly different area in 1984. The formula derived for introducing the correction was found to be highly effective. This method for determining refraction in leveling work is based on integral parameters, is simple to use and increases accuracy. Figures 2; references: 5 Russian.

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CSO: 1865/113

SEVER-38 EXPEDITION TO SUPPLY SP-27 AND SP-28 STATIONS BY PARACHUTE

Leningrad TASS in Russian 21 Nov 86 1150 GMT

[Article: "Into the Polar Night by Parachute"]

[Text] Leningrad, 21 November. (TASS). The members of the high-latitude "Sever-38" expedition, which left Leningrad for the Arctic today, have taken with them parachute systems for dropping heavy freight platforms. They will supply fuel, provisions, scientific apparatus and mail to the SP-27 and SP-28 drifting stations which are now situated in areas of the central Polar Basin which are difficult to reach. It has proved impossible to lay out runways on the ice for heavy transport planes so all the freight has to be dropped by parachute. The SP-28 station is now situated 1,500 km from the Eurasian coast. About 50 tons of freight are to be delivered. Another 20 tons are earmarked for SP-27, whose drift route lies 200 km from the geographical North Pole. In the next few days, after studying on site the weather and ice situation, specialists of the high-latitude expedition will compile a detailed plan of action and begin flights into the very heart of the polar night.

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SCIENTISTS COMMENT ON NEW ANTARCTIC EXPEDITION

Moscow in English to North America 2300 GMT 16 Oct 86

[Excerpts] Scientists from many countries, including the Soviet Union, are working in the Antarctic and, with the approach of the summer in the southern hemisphere, the time has come to replace the wintering parties there. The details were supplied by our science correspondent Boris Belitskiy.

[Belitskiy] This has been the 31st Soviet Expedition to work in the Antarctic, there were seven wintering parties at the research stations the Soviet Union permanently maintains there. [Passage omitted.]

The new Soviet Antarctic Expedition is due to start work this month. Several more flights are scheduled from Leningrad and eight passenger, transport and research vessesl are due to set out from Soviet seaports for Antarctic shores. Here's what we were told by a well-known Soviet polar explorer, Dr Yevgeniy Tolstikov, a deputy chairman of the USSR Committee on Hydrometeorology and Environmental Control.

[Begin Tolstikov recording in Russian with superposed English translation.] With regard to the new expedition we are doing everything we can to provide it with the best possible facilities and obtain a maximum amount of high-quality data from it. Satellite communications are being extended, since they are promising and have proved to be the most dependable link with our research facilities, providing them with the means of regularly obtaining prompt information. Even now the meteorologists there are beginning to produce 3-day Antarctic weather forecasts for seamen and airmen.

Preparations are now getting into stride to establish yet another, the eighth, Soviet research station there. This will extend the potential of our research settlements situated along the perimeter of the continent. It will contribute to the geological, medical and other scientific programs that are being pursued at the Soviet stations and help to study the radiophysical properties of this vast glacier with the most advanced instruments.

Experiments are also underway to introduce wind-driven generators in the Antarctic, taking into account that the delivery of fuel there is very expensive. This dictates the need to make use of renewable resources there.

[illegible] is now also being attached to studies of the ozone layer. [illegible], ozonometric observations at the research stations are being [illegible], and so is the work of studying meteor trails. All this is part of the studies of the middle atmosphere and lower layers of the stratosphere. Vertical and slant probing is also to be employed to investigate what are known as ionospheric gaps. These are gaps in the ionosphere through which cosmic rays and the solar wind can freely reach the earth from space. These studies of natural processes in a little-explored part of our planet are facilitated by exchanges of scientific data with the wintering parties of other countries. Ever since the Second Soviet Antarctic Expedition there have been close contacts with American scientists in the Antarctic. This tradition is to be continued, and Soviet researchers are prepared both to exchange data again and to receive an American meteorologist at one of their stations.

Every year there are also large groups of 10 to 12 researchers from the German Democratic Republic working at several Soviet stations. Representatives of Czechoslovakia have also begun taking part in this research, and lately scientists from Cuba have likewise joined in this work. Eighteen countries now conduct research in the Antarctic. Scientific interest in Antarctic research keeps growing, and international cooperation in these efforts is growing too.

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CSO: 1865/51-E

IZVESTIYA REPORTS SPLIT IN ANTARCTIC GLACIER

Moscow TASS in English 1719 GMT 4 Oct 86

[Text] Moscow 4 Oct TASS -- A huge chunk of ice has separated from an antarctic glacier, the site of a Soviet polar station, and the fate of the latter is yet unknown, a Soviet newspaper reported today.

The runway ice pack which is some 100 kilometers wide, IZVESTIYA said, was part of the Filchner glacier near the coast of the Weddell Sea in the northwest antarctic and it was there that the Soviet "Druzhnaya-1" seasonal research station was located.

The station, IZVESTIYA said, had not been manned at the time as polar explorers were to come to work there in December, January and February, that is the antarctic summer, as in previous years.

With 15 or so kilometers of clear water now lying between the fugitive ice floe and the deserted glacier, the shape of the antarctic coast had changed, the paper said.

"A study of space photos has not made it possible to establish what has happened to the station: it has either gone down into the crack or has not suffered and is safe," IZVESTIYA said.

There was mothballed equipment, fuel stocks and temporary living quarters at the station, which was established in 1976 for geological and geophysical studies, during the breakup, according to the paper.

"Soviet experts are now considering possible measures to save the station's property if it is still there," it said.

The 170 or so geologists who were to go to the station late this month as part of the 32nd Soviet Antarctic Expedition, IZVESTIYA said, were now to go to another station, at least initially.

"Druzhnaya-1" was situated on the Filchner glacier's edge where it was possible to go by ship to study the ice-bound shelf of the Weddell sea and see if the area holds oil or gas, the paper said.

It quoted experts as stating that the Weddell Sea is promising in this respect.

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CSO: 1865/29-E

BRIEFS

IL-18D FLYING LAB FLIES LENINGRAD TO ANTARCTIC--Leningrad, 16 Oct (TASS). A Soviet IL-18D today successfully completed a Leningrad-Antarctic transcontinental flight, landing at the Molodezhnaya observatory in Enderby Land. Weather forecasts made at Molodezhnaya permitted the most difficult part of the route to be covered, from Maputo across the Indian and Antarctic Oceans. The IL-18D will be used as a multipurpose flying laboratory in the Antarctic; the latest apparatus for geophysical research has been installed on board. Ice landing strips have been built at Molodezhnaya and Novolazarevskaya; similar strips are to be built in the other scientific settlements under the USSR flag. [Summary] [Moscow TASS INTERNATIONAL SERVICE in Russian 1620 GMT 16 Oct 86] 12955

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6 May 1987